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ABSTRACT

As an illustration of competency-based instruction in action, this publication contains a curriculum guide, sample lesson plans, and an explanation of how these materials were derived and implemented in a public school district Comprehensive Employment and Training Act vocational education program in Springfield, Missouri. The model contains a complete job description, task analysis, and instructional analysis for five skill areas plus the supplemental basic skill areas provided by tutors. Representative lesson plans for each of the skill areas are: auto mechanics, clerical, diesel mechanics, food service, and welding. The tutoring lesson plans cover basic instruction in English and mathematics. These lesson plans include lesson titles, student learning objectives, supplementary teaching/learning tools and materials, information sources, references, learning activities, and evaluation items. The model lesson plans include several types of instructional approaches, such as lecture, demonstration, and student participation. (KC)

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MODEL COMPETENCY-BASED INSTRUCTION PROJECT

SPRINGFIELD, MISSOURI

1981-1982

by

PATRICIA A. SADE

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PREFACE

This publication is a collection of technical information derived from a public school district's implementation of a Competency-Based Instruction Program in its CETA-funded vocational programming. The publication is intended as an "Informational Guide" for other districts striving to meet the modern requirements for vocational curricula. During the year of implementation, there were many frustrations caused by many circumstances. Those "Frustrations" are candidly discussed in this volume. It is our intention to provide this information so that others may profit from our mistakes and successes.

The primary purpose of this project was to illustrate "Accountable Education" that is efficient and hopefully less costly to the tax-paying public. To accomplish "Accountable Education," this project attempted to implement and validate a competency-based curriculum process that incorporates input from private industry, prime sponsors and vocational educators.

The secondary purpose of the project is this report. It is intended as an illustration of competency-based instruction in action. After reviewing the enclosed lesson plans, a seasoned vocational educator may feel that there is too much documentation. Indeed, after a year's experience, the staff and faculty of the Springfield Skill Center would agree. The lesson plans included in this publication, while intended as examples only, are lengthy and often duplicative. Other formats might be considerably different and still be completely acceptable.

The curriculum efforts of the Springfield Skill Center represents a beginning. This project is, however, not intended as a complete conversion as future efforts will be concentrated towards criterion reference for each competency taught.

The authors and staff of this project would like to express appreciation to several groups of individuals that made this effort possible. The State Employment and Training Council under the chairmanship of Ms. Barbara Carroll provided the funds and invaluable support for the project's success. Additionally, numerous representatives of private industry have participated in many ways and contributed greatly to the project. Members of the private industry councils from the Prime Sponsors serving the Springfield SMSA have also provided significant support and assistance. The staff would like to especially recognize the support, encouragement and openness of Mr. John Schell, Missouri Department of Elementary and Secondary Education, Dr. Jim Shoemaker, Director of Graff Area Vocational-Technical Center, and Mr. Louis Bruton, Director of the Springfield CETA Skill Center.

The real heroes of the project are the instructional staff of the Springfield CETA Skill Center. These instructors have gone above and beyond and are responsible for the high quality of the work included in this report.

SECTION 1

INTRODUCTION

I. INTRODUCTION

The Springfield Graff Vocational CETA Skill Center received a 1% special grant from the State Employment and Training Council. This federal allotment to the Skill Center made it possible to begin development of Competency-Based Instruction (CBI) with a cooperative effort that included the State Employment and Training Council (SETC), Prime Sponsors (Springfield City CETA and Balance of State CETA), the Department of Elementary and Secondary Education (DESE), and the Springfield R-12 School District.

The grant to the Springfield Skill Center appropriated by the SETC was to develop a model of CBI that would provide a validated model outlining specific procedures and containing validated curriculum materials for replication by other prime sponsors if they so desired. This model would update the current curriculum by closer identification of trainees' individual needs, increase trainee awareness of training areas, promote improved management of trainee progress, and encourage direct input by private industry to curriculum development resulting in industrial validated competencies.

The purpose of the proposed model was to implement and validate a process that incorporated input from private industry, prime sponsors, and vocational educators by establishing a systematic and validated approach to skill training. The approach of developing this model allowed for implementation, evaluation and feedback. This would improve program and instructional accountability by consolidating educational and private industry's goals to facilitate innovative approaches and technological advances directed into skill program curriculum.

HISTORY AND BACKGROUND OF COMPETENCY-BASED INSTRUCTION

The vocational educator is continually seeking more effective methods to improve instruction. He/she is well aware that eventual success regarding job placement and job retention for trainees depends upon the mastery learning of knowledges and skills that relate directly to entry-level employment of the trainee's chosen trade. Conventional instruction often does not adequately prepare a worker for the job, nor does it accurately measure his readiness to begin entry-level work. Competency-Based Instruction (CBI) has been designed and developed by outlining a systematic, specific plan of action that can be taken upon entry of a skill training program, whereby, the trainee and instructor can plan a prescriptive plan that will individualize his/her training, relate to employer needs, shorten training time, display greater opportunities for success, build positive attitudes, and insure skill mastery.

Competency-Based Instruction is not a new approach to mastery learning in education. It has been used and refined by the United States Army for many years. In the early 1970's, federal monies were alloted to many universities and colleges to field test and reform CBI programs by grants derived from "The Fund for Improvement of Post Secondary Education" (FIPSE) appropriated by the United States Department of Health, Education and Welfare. Many public and private schools across the country now use CBI as do many private industrial training programs because it has been proven as an efficient vehicle for training of specific tasks that produce a "competent worker."

DEFINITION OF COMPETENCY-BASED INSTRUCTION AND HOW IT RELATES TO ADULT CETA VOCATIONAL SKILL EDUCATION

Competency-Based Instruction, in a vocational setting, is a systematic instructional activity that teaches occupational skills, attitudes, and knowledges critical to employment. The concept of CBI was discovered and developed hundreds of years ago by master craftsmen. They trained an apprentice until mastery of the skill being taught was accomplished.

Current CBI is based on analysis of tasks to be performed, and then further organized into an instructional analysis. As a result, training outcomes are expressed in performance terms closely related to labor market expectations. The criteria for trainee assessment is pre-established in the process of making an instructional analysis from a task analysis. The instructional analysis is the process of arranging defined tasks into natural divisions, or mini-courses, that are independent units of instruction. These instructional packages are validated by an advisory committee from industry, Prime Sponsors and the Private Industry Council, thereby making vocational instruction more relevant to trainee, school and employer. Some characteristics of a CBI program are:

- Course content based on actual tasks to be performed that are measurable.
- Trainee's performance objectives are specified in advance of instruction.
- Trainee's achievement is based on demonstrated competency (not grades or hours spent on skills).
- Criterion-referenced measurement is used to evaluate the obtainment of performance objectives.
- Instructor and trainee performance is accountable and efficient.
- The instructor becomes a manager and facilitator of instruction.

Adults know what they want to learn and many are very highly motivated. CBI informs trainees of exactly what they will learn, how they will learn it, and how well they must be able to perform the required competencies to become employable in today's work force.

SPRINGFIELD'S WORKING DEFINITION OF COMPETENCY-BASED INSTRUCTION

Competency-Based Instruction at the Springfield Skill Center was proposed to enhance curriculum validity by promoting an exacting skill training program based upon trainee's performance outcomes that were approved by the advisory committees. CBI, as defined for this particular model, is a method of instructional change to facilitate individualized instruction in an open-entry/open-exit program. Our instructional process now stresses outcomes of specific task performance that is validated by industrial and educational standards.

Prior competencies, enhanced with new competencies, taught in our skill classes are meeting today's labor market demands with the cooperation and participation of the advisory committees. The outstanding difference made by CBI for the Springfield Skill Center is the means by which the instruction is being delivered to trainees. The instructors have found that the CBI approach to teaching vocational skills helps them to organize materials, improves classroom management, validates accountability, and fosters cooperation between school and community.

Competency-Based Instruction seems to adhere particularly well to CETA skill training programs because of the types of individuals served. The participants come to the skill center with diversified and often checkered work histories. Frequently they are in need of a specific vocational skill that can be learned in a short period of time. The emphasis is on a quick return to the job market. Skill training programs are designed for open-entry/open-exit with a training period usually encompassing 18-24 weeks. To enhance instructional efficiency, vocational competencies must be well-defined and the curriculum organized by subject content that is appropriate to the current job labor market. The curriculum must also demonstrate a performance level that is required for an entry-level skilled person so he/she is competitive in the work force.

SPRINGFIELD SKILL CENTER'S ROLE IN IMPLEMENTATION AND DEVELOPMENT OF A MODEL PROJECT

The Springfield CETA Skill Center's role in implementation and development of a competency-based instructional curriculum was defined by the project design. The project was written cooperatively by the CETA Prime Sponsors, their Private Industry Councils, and the Missouri Department of Elementary and Secondary Education under the direct supervision of the Springfield R-12 School District. The project was designed to include the following major elements: job description, occupational analysis, instructional analysis, and lesson plans.

The skill center was to organize, develop and implement Competency-Based Instruction curriculum. The curriculum was to be job/employer oriented by utilizing advisory committees from private industry for validation. The Private Industry Council and Prime Sponsors would provide continual guidance and approval throughout the project development. A quarterly narrative report to the Division of Manpower Planning regarding project progress was to be provided.

A final evaluation report of the project for submission to the Department of Elementary and Secondary Education and the SETC would be written. This report would be distributed to all Missouri Prime Sponsors to be used as a model instrument for other CETA skill centers in developing CBI curriculum.

ANTICIPATED ADVANTAGES OF COMPETENCY-BASED INSTRUCTION TO TRAINEE, SCHOOL, FUTURE EMPLOYER AND COMMUNITY

The renovation of an existing traditional curriculum to CBI will be challenging, to say the least, and many times very frustrating to all persons involved. There are, however, numerous advantages that become obvious. These advantages should be recognized by administrators and staff when considering a performance based curriculum.

TRAINEE ADVANTAGES

Under CBI the trainee has:

* Control of learning opportunities that are goal oriented.
* A job description for each skill area provided that will significantly improve trainee's choice of vocational training.
* No surprises--trainee knows exactly what to expect and what is expected.
* Mastery of each prerequisite competency before attempting to move on to higher skill levels of attainment.
* More personal contact with instructors as the instructor becomes a classroom manager rather than a group lecturer.
* A list of mastered exit competencies with accuracy levels that will be provided to each trainee upon completion of his/her course.
* The opportunity to by-pass previous acquired knowledges and skills by pre/post testing of instructional materials.

- Progress reports that will be very specific, listing competencies mastered and at what level of accuracy.
- A no-fail environment that invites collaboration among peers that encourages individual responsibility for learning.

SCHOOL ADVANTAGES

Under CBI the school has:

- Less responsibility of trainee performance. The trainee becomes the controller of his/her efforts.
- An accurate trainee skill assignment due to competency information. (What is expected of a "competent worker.")
- An opportunity to work as a team with the private sector. Together they can bridge the gap between skill training and education.
- Exact exit performance levels for skill training as prescribed by industrial standards. This verifies educational effectiveness related to industrial standards.
- Opportunities for an objective and subjective evaluation of present instruction. It will reflect program flexibility, individual needs of trainees, and employer's needs for today's job market.
- More efficient feed-back process that channels to enhance agency and follow-through with job placement and retention.
- A positive feeling about the validity of their own accountability and professionalism.
- Greater flexibility in placing trainees in curriculum and in maximizing trainee potential.
- A good working relationship with individual advisory committee members that will keep them well-informed of any change in job market demands.
- An effective way to evaluate curriculum by trainee's performance on exit skills, in relationship to job placement and retention.
- A very systematic and professional approach to teaching that accents outstanding organizational skills and positive classroom management.

- * A noticeable improvement in delivery systems used and implemented by instructors.
- * An on-going evaluation of effectiveness of training packages.
- * A potential method to develop media to reinforce or instruct basic skills, thereby giving instructors more time for special need trainees and individualized instruction.

ADVANTAGES TO FUTURE EMPLOYERS

Under CBI the future employers have:

- * A solid educational/industry validated curriculum offered at the skill training center that is designed with the employers' training needs in mind which includes performance, attitudes, and dependability of which industry will make a major on-going contribution.
- * A better working relationship and understanding between school and employers.
- * A prime source for hiring appropriately trained entry-level workers.
- * A chance for private industry to make training needs known. Employment and Training Programs can accommodate their particular needs and instruct trainees accordingly.
- * First hand informational knowledge of what is happening in Employment and Training Programs.
- * A list of exit competencies with accuracy levels of trainee's performance supplied by the skill center at program completion.

COMMUNITY ADVANTAGES (TAXPAYERS AT LARGE)

Under CBI the taxpayers have:

- * A new public awareness of what the skill center is doing and what type of skills are expected from a competent program completer.
- * Input regarding adequacy of training via trainee's success or failure.

- An Employment and Training Program that is delivered by a systematic curriculum. It is documented by advisory committees from local industry that meets current community employment needs.
- An account of public money spent on employment and training.

DEFINITION OF CBI TERMS USED IN MODEL PROJECT

This document may contain terms that are unfamiliar to the reader. The specific terms of Competency-Based Instruction may not be new, but the working definitions perhaps are different. The following terms will be defined according to the CBI language used in developing the Springfield model.

JOB DESCRIPTION: The job description defines specific tasks required of a competent worker. It relates to local employment demands by describing salary range, safety requirements, work schedules and general working conditions.

TASK/COMPETENCY: A skill or duty required of a competent worker while performing or occupying a position.

TASK ANALYSIS: A listing of all tasks, in prerequisite order, required of a competent worker while performing a job or occupying a position.

INSTRUCTIONAL ANALYSIS: A process of arranging the task analysis into natural divisions, or mini-courses that will become independent units of instruction.

PERFORMANCE OBJECTIVE: A statement of tasks to be mastered as a result of the instruction. Performance objectives are organized into task, conditions, and criterion statements to assure that they are measurable.

LESSON PLANS: A means of instructional organization that delivers pertinent information to trainees (knowledge-demonstration lessons) that measures each trainee's performance. It is a means for both instructor and trainee to identify the outcome or anticipated result of his/her efforts.

PRELIMINARY INSERVICE

Preliminary inservice was carefully planned and presented to the instructional staff at the skill center. Workshops explaining CBI concepts began as early as 1980. At this time a workshop outlining procedures for developing occupational analysis and lesson plans was introduced. This workshop was followed up by inservice, explaining testing techniques, classroom management techniques, and uses of media for purposes of individual instruction.

Beginning June, 1981, a two-day inservice workshop for the Springfield Skill Center CETA staff was presented by consultants from the University of Missouri-Columbia and John Schell, Supervisor, Missouri Department of Elementary and Secondary Education. This was the initial introduction concerning a 1% proposal that would require the Springfield Skill Center to begin a new endeavor--to re-evaluate the present curriculum--with local industry's involvement, transposing the present educational system into a competency-based instructional curriculum.

This workshop focused upon the project procedures. Each component part of CBI was defined and discussed. This included all phases of CBI development and implementation. Community implications, project details involving instructors, and requirements of staff participation concerning competency-based instruction curriculum development were emphasized.

The instructors contracted for deadlines to meet the projected time-lines set by the consultants for project completion by September 30, 1982. As a result of this workshop, instructors began composing a task/competency list for their skill area and contacted industry to establish advisory committees for each skill area. Consultants set up specific dates with the staff to review work and gave individual assistance from June-October, 1981.

With the beginning of the actual project, a Curriculum Specialist was hired and he, with the assistance of the consulting Missouri University staff, held a workshop that focused on instructional analysis, lesson plan writing, and overall goals of a comprehensive CBI process. The Curriculum Specialist met with staff to give individualized direction and assistance in developing each area's CBI curriculum throughout the project's existence.

SECTION II

PRIVATE INDUSTRY, PRIME SPONSORS, AND ADVISORY COMMITTEE INVOLVEMENT IN DEVELOPING CBI MODEL

II. PRIVATE INDUSTRY COUNCIL, PRIME SPONSOR, AND ADVISORY COMMITTEE INVOLVEMENT IN DEVELOPING CBI MODEL

THE PRIVATE INDUSTRY COUNCIL'S INITIAL INTEREST IN CBI TO MEET PRESENT AND FUTURE NEEDS OF THE SPRINGFIELD SKILL CENTER AND THE COMMUNITY

The 1% project proposal was initiated by cooperative efforts that involved the Balance of State-Missouri and City of Springfield CETA Prime Sponsors, their Private Industry Councils, along with the Missouri Department of Elementary and Secondary Education and the administration of the Springfield R-12 School System. The decision to participate in a federal funded project to revise and update the present curriculum at the Skill Center into a Competency-Based Program of Instruction was based on 1) the needs of the current curriculum and 2) the need of a representative model to be used as a guide in the development of CBI throughout all CETA skill centers in Missouri. It was felt that CBI training would address the outlined suggestions for curriculum change by developing a closer identification with private industry, promote greater program accountability, and provide better management of trainee progress. The CBI project, as proposed, was designed to direct private industry input into curriculum development, increase program accountability, display clearer trainee expectations, and explore and validate a systematic identification of industry competencies to be incorporated into the training program.

SOCIOECONOMIC BACKGROUND OF SPRINGFIELD, MISSOURI, FOR PURPOSES OF COMPARISON TO OTHER SKILL CENTERS

Springfield's area of dominate influence extends to 40 counties with a population of 1.2 million people. According to the 1980 Census Bureau population figures, the Springfield Standard Metropolitan Statistical Area's population was 206,054. This represents a 23% growth since the 1970 census. The projected population growth from 1979-1984, according to the Sales and Marketing Management's 1980 Survey of Buying Power, Part II, lists Springfield as 20th in the nation which represents an 11.8% increase. Springfield's SMSA racial distribution (1980) was 98.2% White, 1.5% Black, .5% American Indian, Eskimo, and Aleut., .4% Asian and Pacific Islander, and .2% other.

According to the fourth quarter 1981 survey of cities by the American Chamber of Commerce Research Association, Springfield has a cost of living index 9.5 points below the national average. On the various items surveyed, Springfield ranked 80.4 on transportation, 92.7 on health care, 97.7 on miscellaneous goods and services with the national average of 100 on the indexes.

Springfield's average civilian labor force for the year 1981 was 106,642, which is 2.8% higher than the 1980 average civilian labor force. Manufacturing draws 17.7% of the work force into more than ten categories including lumber, durable goods, machinery, food processing, and transportation equipment. Non-manufacturing comprises a large portion of the work force primarily in trade, services, and transportation. Springfield is the third largest retail trade market in the state and is one of the top 200 U. S. markets. It has approximately 953 retail firms and 277 large and small wholesale firms. There are 30 major shopping centers plus several strip shopping centers, shopping districts, speciality shopping areas, and four malls--one being the third largest in the state.

Even though agriculture has been a strong base for Springfield's stability throughout the past decades, manufacturing, retail and other service areas are now playing a major role in the growth and development of the metropolitan area and herein lies Springfield's projected future. The growth in diverse manufacturing firms complied with an increase in tourism has increased the demand for employees with industrial vocational-technical skills.

Springfield's industrial base is highly diversified. Among Springfield's larger employing industrial firms are Assemblies of God International Headquarters with its Gospel Publishing House, Fasco Industries, Inc., R. T. French Company, General Electric Company, Kraft Inc., Lily-Tulip Inc., Advanced Circuitry Division-Litton Systems, Paul Mueller Company, Dayco Springfield Plant, 3M Company, Zenith Electronics Corporation, and Reyco Industries.

These businesses have been helpful resources in placement of CETA trainees. Most of the above businesses require a large clerical staff which promotes substantial need for the two Skill Center Clerical classes. Jobs range from receptionist, legal secretary, or bookkeeper depending on the skills the employers require or the level of competency mastered by the trainee.

The welding skill continues to be significant and placements remain stable even with the current waivering economy. Competent entry-level welders find a demand for their skill at a comfortable wage with promises of steady employment with good benefits.

Springfield houses the central terminal for many trucking companies. This lends itself to a demand for diesel mechanics and diesel mechanic helpers. This particular skill program is not offered elsewhere by Missouri CETA Skill Centers, and skilled diesel mechanics and helpers are sought out by numerous large corporations and trucking firms across the nation.

Due to the economy and suppressed cash flow, Springfieldians are repairing cars rather than purchasing new ones. This supports the skill training provided by the Auto Mechanics area.

The most recent community trend has placed a great deal of emphasis and excitement on tourism. Our community is enticing tourists by building convention centers and other types of special promotions which have increased the requisition for more food service and management personnel.

Trainees come to the Springfield CETA Skill Center from a radius of approximately 100 miles. The trainee population is quite varied. We serve trainees within an age range from 18-65 that meet CETA guidelines. The average length of skill training is 18-24 weeks.

ADVISORY COMMITTEE'S ROLE IN DEVELOPMENT OF COMPETENCY-BASED INSTRUCTION CURRICULUM

Every skill training program at the Springfield CETA Skill Center has a curriculum advisory committee. Persons from the business community who are directly related to the job for which the trainee is being prepared are represented. In addition, one of the seats on each committee is occupied by a member of the Springfield Private Industry Council.

Each advisory committee represented a wide range of input from small business to large corporations. Committee members were asked by the Springfield CETA Skill Center to invest their time and effort in planning an appropriate instructional program to meet the immediate and future needs of our community.

The function of a curriculum advisory committee is to assist the project staff with all phases of CBI. They actively participated in the development and revision of the job description, occupational analysis, and validated lesson plans. This validation was crucial to instruction as competencies mastered were related directly to industry's expectations. Each member attends committee meetings as well as meeting individually with the instructor to discuss curriculum materials.

The CBI project has been well received by local industry. A curriculum advisory committee member commented very positively about the opportunity to impact the program at so many levels. Other committee members welcomed the chance to offer suggestions about units covering such competencies as grooming, speech and other personal traits that are often overlooked in vocational training programs.

The advisory committee for each skill area has been very influential and of a great importance in developing the competency-based curriculum. There are numerous examples of outstanding assistance from private industry. The following is a brief summary of employer assistance that could help other training institutions desiring employer involvement.

Word processing is going to be incorporated into the Clerical skill classes. The instructors wanted to include this area of instruction in the validated CBI. The advisory committee supplied the instructors with information concerning equipment that was being used in industry. Additionally, they suggested word processors that they had found to be the most versatile and appropriate for training. The instructors were invited to visit plant locations to see their set-ups. Lists of industrial competencies required of the operators employed from entry-level through highly-skilled experienced personnel were provided by these committee members to assist in curriculum development.

In Auto Mechanics, the task analysis included more information than could be taught in the alloted training period. The advisory committee helped the instructor sort out and revise the original task list to include only essential competencies required of an entry-level employee. By this process, the skills were ranked by a prerequisite order allowing auxiliary competencies for those who wanted or could achieve a higher level of skill mastery.

The Food Service Advisory Committee has assisted the instructor in altering the entire Food Service program to include management training. The committee consisted of diversified representatives, which included fast food restaurants as well as elegant dining establishments. This diversity has made the Food Service Advisory Committee extremely helpful to the instructional process. With considerable input from the advisory committee, the training format will pinpoint a specific set of skills that will correspond and adapt themselves to all types of food service and management.

The Diesel Mechanic Advisory Committee was pleased with the skill competencies to be taught. However, they felt that there was some additional information that needed to be recognized by trainees. Suggestions for additions to the job description were 1) SKILLS: required duties of daily production reports and clerical duties (i.e., time sheets, standard costs, production breaks), and 2) WORKING CONDITIONS: minimum supervision and responsibilities of an employee such as customer relations and continued update of current changes and trends of their trade. Another suggestion was to include safety in each unit of the instructional analysis and include the lubrication system as a teaching unit or lesson.

The Welding Advisory Committee spent considerable time with the competency/task list. An example of comments made to the instructor was "the trainee should be made aware of the 'time element'; for instance, if one man makes a good foot weld in a given time and another can make a comparable weld in less time, the second man is the more desirable employee." The advisory committee agreed that skill performance mastery was very important but once a worker is hired with the demonstrated skills he/she must display good attitudes, attendance, neatness, and cooperation; therefore, these elements of job retention must be continually emphasized many times during the training program.

PLAN OF ACTION TO CONTINUE CONCERNED INVOLVEMENT AND SUPPORT FROM PRIVATE INDUSTRY COUNCIL AND PRIVATE SECTOR

The support and endorsement of the PIC Council and Prime Sponsors is of upmost importance in program survival. The Springfield Skill Center will continue to involve them as they revise and continue to develop curriculum instruction and media to transport the instructional program packages that they have helped them design. The Advisory Committees will be encouraged to remain active with several planned meetings as CBI development continues. They will continue to advise the instructors as to changes made in industry and suggest ways they can teach towards these changes. Another significant role the advisory committees can play is to give the skill center follow-through information regarding how well the CBI program is producing a "Competent Worker" in the labor force and supply data regarding retention rate and long-term follow-through of trainees' progress. By this process, the Springfield Skill Center can continually re-evaluate their CBI program and improve and revise it to become a vehicle of skill training that will intersect the needs of industry and produce a competent entry-level work force for the community.

The instructors will continue to conduct community surveys of specific occupational competencies that will be required of an entry-level person. These will be field-tested in the classroom and validated by advisory committees. By utilizing a process of addition and deletion of specific needs of employers, a plan of action to serve trainees and community with an up-to-date industry-validated curriculum is being established and will be periodically updated.

PRIME SPONSORS' FOLLOW-THROUGH UPON PROJECT COMPLETION

Legislation allowing, the Prime Sponsors will continue to provide service to trainees such as intake selection, referral, and job placement. CBI will facilitate all of the critical program activities. Job placement will be extremely important because of the economic situation. But due to the theory and implementation of the CBI training devised by the skill center, the prime sponsor will be able to specifically advise employers of what our trainees have to offer them at program completion. The job description from each area will make intake of new trainees easier as each job will be well-defined, thereby helping the intake and placement personnel become more aware of what the skill center trainee has to offer and what the trainee can expect to learn. Since the job description is validated with employer discrimination, trainees will know specifically what employers expect and choose their area of training with confidence.

The Private Industry Council and Prime Sponsors along with the advisory committees have played an important role in creating and validating this transportable model of CBI that can be used by other skill centers when developing or revising their present curriculum.

SECTION III

DEVELOPMENT OF SPRINGFIELD'S COMPETENCY-BASED INSTRUCTION MODEL

III. DEVELOPMENT OF SPRINGFIELD'S COMPETENCY-BASED INSTRUCTION MODEL

PROCESS OF THE DEVELOPMENT OF SPRINGFIELD'S COMPETENCY-BASED INSTRUCTION (STEPS OF PROCEDURE)

Such comments as "Things get worse before they get better" and "Hang loose" appear many times throughout publications that refer to the emotional trauma when renovating a program's curriculum. The process and procedures defining competency-based curriculum appear to be simple and straightforward at first glance. However, after careful research of other programs and experiencing the development of this model, the Springfield Skill Center has found that CBI, like any new approach or method, can be exhausting, frustrating, and time-consuming. It is suggested that the key to developing an outstanding competency-based curriculum with the least amount of problems is "Open Communication." Without this important element, many hours will be wasted.

We cannot overly stress that before CBI development is begun all personnel involved must realize 1) the importance of modification and updating of present curriculum, and 2) how CBI will affect the current instructional program. A strong emphasis on instructor's role from onset to implementation combined with positive motivation and preparation of staff is essential. Instructors must achieve success at each stage of development and perceive CBI as benefiting their trainees as well as themselves. Short-term and long-term goals of CBI program objectives must be researched and established before the onset of curriculum change. Instructors must personalize these goals and experience success resulting from their efforts. Tangible changes will result, such as newly developed instructional resources. In utilizing these new classroom aides, the instructor becomes the manager of instruction. Instructors will have more time for demonstrations and individual attention to trainees' needs. The increased classroom efficiency will facilitate open-entry/open-exit education.

This is the most important section of this publication. The instructors' and administrators' input and comments relating to their experience in developing this model project will be discussed in detail. Our purposes are to 1) give you a specific step of procedure that will assist you in developing your CBI curriculum, 2) discuss the administrative lessons that have been learned, and 3) discuss the instructor's point of view. Our successes and failures will facilitate your curriculum development. Implementing a systematic CBI program can be a positive experience with minimum frustration.

The following suggestions and recommendations composite a plan of action of which, through trial and error (to say nothing of frustration), the Springfield CETA Skill Center with the assistance of private industry developed a Competency-Based Instruction Program.

An initial workshop conducted by the faculty of the University of Missouri Department of Practical Arts and Vocational Technical Education (P.A.V.T.E.) explained what the staff would be expected to do, and how they would go about developing a CBI curriculum in each area of instruction. Instructors were given a "Time-Line" in which to complete the initial phases of the project. The initial work included a job description, task analysis, and instructional analysis. The instructors first began their plan of action by contacting prospective advisory council members. Once the committees had been selected and approved, the preliminary phase of the project began.

Using the Dictionary of Occupation Titles as a resource, the instructors began their work on the Job Description. The Job Description had to relate directly to area job market demands so other resources were sought out to document a valid tool for Springfield and outlying areas. Instructors used their knowledge of the local job market, visited local businesses and industries to update their awareness of new trends and demands, solicited feedback from former trainees, observed workers performing on the job site, and sent out surveys to employers. Once collected, this data was reviewed by the advisory committee and developed into a final industry/school job description.

It was relevant that the tasks included in the job descriptions transfer directly to the Task Analysis. This results in program consistency and validity. Using the developed Job Description as a guide, the instructors, along with their advisory committees, began developing a task-competency list. This task analysis was based upon job descriptions, instructor's knowledge of private sector competencies, present curriculum, past placement requirements for trainees, and recent contact with employers regarding placement of skilled people from each area.

A breakfast was held for all advisory committee members, Private Industry Council, and Prime Sponsors to formally introduce the process and development of CBI. Key topics of discussion were: What is CBI? How does it merge education and industry? What role will the private sector play in curriculum development? Stress on the importance of the committees' objective input for ideas and evaluation of the present curriculum were brought upfront as predicting the project's success.

Upon the meeting adjournment, each instructor met with his/her advisory committee and answered any questions the committee had about CBI. They requested committees' input (either additions, deletions, and/or corrections) to the Task Analysis. The instructors proceeded to give their advisory committee a tour of the skill classrooms and shop area and presented a brief synopsis of the existing program and background on who is served and why. Contact was continued with each advisory committee until final competency lists were made and approved.

All competencies were arranged in a prerequisite order in which to be taught, to implement an efficient systematic educational program. Each competency or task is broken down into teaching units called an Instructional Analysis. This included performance outcomes backed-up by informational and demonstrational lesson plans.

Lesson plans were written by each instructor stating specific performance objectives that would relate directly to skills that must be learned in a prerequisite order so that a competency (task) could be mastered. Advisory Committees worked closely with each phase of this process.

Continental breakfasts, luncheons or dinners were periodically held for committee members by the Skill Center. Each instructor arranged for the most convenient time for their advisory committee members to meet. During these meetings the instructor, administrators, and Curriculum Specialist presented newly developed material to the committee for discussion and revision according to industrial standards and job market expectations. Instructors would follow-up the meetings by personal contact and on-site plant visitation.

Reliability of lesson plan content was evaluated by a specific test of each lesson plan objective after a lesson had been delivered to trainees (information or demonstration). Instructors and committees revised lesson plans until the third revision, testing for validity of performance outcomes.

In summary, the Springfield experience suggests the following steps of procedure. Each step should be completed before progressing onto the next. Once all the preliminary elements are accomplished, the instructor can go back, revise, and edit. The suggested steps of procedure are:

- Extensive Inservice for Staff.
- Advisory Committee Selection.
- Job Description.
- Task Analysis.
    - Competency/Task List.
    - Arrange Competency/Task List in Prerequisite Order.
    - Arrange Competencies/Tasks in Units of Instruction.
- Instructional Analysis (to know--to do).
- Lesson Plan Writing.
- Packaging Instructional Materials.

ADMINISTRATIVE LESSONS LEARNED FROM IMPLEMENTING A COMPETENCY-BASED INSTRUCTIONAL PROGRAM

The following is a list of lessons learned resulting from implementing this experimental model. It describes procedures the Springfield Skill Center would do again, and some that they would do differently. These suggestions are in no particular order of importance. Each, however, is significant.

- Inservice for administration and instructors should be well-planned and thoroughly prepared. Only a short period of time between workshops is recommended for better retention and reinforcement of overall project objectives. The importance of pre-planning cannot be understated.
- Administration should be aware of implications of long-range CBI objectives regarding program implementation. This should be viewed as relating to instructional and curriculum improvement. These ideas should be shared with the staff during preliminary inservice.
- To insure program success, everyone involved should understand the full extent of his/her role. Role ambiguity can be a source of unnecessary frustration among administrators and teaching staff.
- Administration should be cognizant of the vital role they play in staff support and morale throughout program development. Unfortunately, it is not enough to be aware of the importance of staff support. Many instructors implementing CBI methods will require constant affirmation and reinforcement.
- Clear statements of philosophy, concepts, and terms must be made and adhered to by consultants, administration, and staff. Confusion among concepts and terms can be a problem.
- Any consultants utilized should be briefed and aware of the skill center's internal organization relating not only to curriculum but program operations and processes before modifying and implementing CBI.
- Budget monies for long-term implementation of project including new materials, media, etc. should be considered and secured.
- Administrators should select a CBI format suitable for their particular skill center.

- Administration should expect disorganization at the beginning of CBI but keep open communication with staff. Be aware of instructors' feelings at all times.

- Curriculum Specialist should be presently on staff or one who knows the needs of the present personnel. He/she should also relate positively to the faculty.

- It is critically important that the Curriculum Specialist should be hired at the conception of the project.

- Curriculum Specialist should work closely on a one-to-one basis with staff following introductory workshop so that instructors feel comfortable with their role in the project development.

- Curriculum Specialist should work with consultants as his/her educational source throughout the project development.

- Curriculum Specialist should be sole consultant for instructors after initial workshop.

- Curriculum Specialist should be given time to research CBI and seek out instructional materials that are available before initial project begins, giving the instructors many sources to which they can refer. If possible, the implementation phase should be planned and executed by the Curriculum Specialist.

- Curriculum Specialist should be informed of his/her specific duties and responsibilities accompanied by the authority to follow-through with responsibilities.

- Curriculum Specialist should maintain constant direction for instructors enforcing due dates. This will help reduce minimal concerns and sidetracking.

- All new employees should be selected to fit program innovations, priorities, and directions; and should be so informed when being hired.

- Instructors must realize that CBI is an on-going process of meeting industry's demands in a highly technical world and labor force. The need for keeping up with advancing technology demands constant curriculum reviews.

RECOMMENDATIONS FOR IMPLEMENTATION
INSTRUCTORS' APPROACH

Before recommending specific ideas for implementation, it is important that the philosophy adopted by the CETA staff at the Springfield Skill Center be defined as a premise for what they expected and continue to expect as a result of CBI. Competency-based instruction is simply a means of bringing vocational education one step closer to becoming a "science" and less of an "art." They feel that this systematic approach will enhance their educational productivity and performance by developing a technology of teaching that is equal to the increasing challenges of our complex world in which we work and live.

After the model was developed, the instructors were asked to respond to a questionnaire concerning project development. They were asked to express their honest opinions (positive and negative) regarding the following topics: An overview of the project--what was good, bad, or should have been handled differently, suggestions of specific ways the CBI model could have been made easier for them to develop, how the project affected their method of instruction, and what future changes they perceived as CBI development continues. The following recommendations are a result of this survey. These recommendations will ackrowledge some definite ideas that will make the transition to a CBI curriculum from your present means of delivery smoother.

* Instructors cannot be overprepared for the development of CBI. The process is very exacting, with the resulting product a documentation of the employment needs of each skill area and how the school plans to fill these needs with entry-level employees. Before beginning CBI development, it is highly recommended that you read Handbook for Developing Competency-Based Training Programs by William E. Blank.

- Instructors need practical experience during workshops when introduced to elements of the CBI process. Techniques and procedures should be reinforced at the completion of each workshop by written samples of the elements presented.

- Another important element that should be mastered by instructors before the CBI curriculum is begun pertains to domains of learning. The instructor's self-evaluation of the present curriculum in his/her area will reveal at what level the present materials are currently being taught; therefore, areas or domains not included in instruction can be incorporated during curriculum transition to support weak areas. This will improve lesson planning and evaluation of performance objectives.

- The instructor should keep an organized master file of all competency-based instructional material and advisory correspondence for documentation and implementation purposes.

- Work closely with your advisory committee. They will be your "Ace in the Hole." Your rapport with them will make or break your instructional program, and they will be more than receptive to what you are trying to do with your curriculum. They may even offer you additional services that are unexpected.

- A step-at-a-time procedure, making sure each element of CBI is completed before moving on to the next developmental element, is recommended. This will make the instructional and delivery process much clearer to you and each step will give you directionality for the next.

- Instructors must have hands-on experience on each new element of the competency-based instruction process as it is developed. As much time as needed should be spent with each instructor by the Curriculum Specialist until he/she is sure the instructor understands and can progress independently with confidence. We stress again--each element of the CBI process should and must be clearly defined and finished before moving onto the next element of the project.

- Safety is of upmost concern. Therefore, safety can and should be included in each lesson plan as it is pertinent either in the introduction or in the conclusion statement, preferably both. This would reinforce shop safety throughout all activities, not only in specific lessons on safety in each unit of instruction.

- Further inservice that relates to CBI implementation and delivery should be introduced as the project enters lesson plan development. Although lesson plans are written the same whether written for individualized instruction or group instruction, the use of media and different types

> of delivery systems should be employed and explained at this time to give instructors a look at optional means to transport packages that can be interesting and beneficial to trainees.

If approached with a positive attitude and adequate preparation, CBI will clearly state trainee outcomes, produce carefully developed packaged learning materials, focus on learning--not teaching, insure trainees' mastery of competencies, and individualize and personalize your skill class. This instructor-managed curriculum will self-pace learning and accommodate open-entry and open-exit while accurately evaluating each trainee's individual level of performance and skill mastery.

SECTION IV

PROGRAM IMPACT

COST EFFECTIVENESS

In fiscal year 1982, the unit costs associated with the training outcomes of the Springfield Skill Center, when compared to other Balance of State Skill Centers, are quite low. Comparisons of average costs are, however, risky. It is almost impossible to account for the various conditions that can contribute to the costs of training. For example, the philosophy of the selection and referral agency can contribute significantly to costs by screening practices that favor "brighter students" that move through training faster thus allowing greater turnover of training slots. Because of this and other unusual conditions that occurred in 1982, the cost analysis included in this report should be considered baseline and compared in subsequent years. A more accurate picture of the cost effectiveness of competency-based education can be drawn upon the comparison of 1982 costs to those of 1983.

A cost analysis of the 1982 results consists of the following information.

PROJECT COST AND PERFORMANCE ANALYSIS BY OCCUPATIONAL AREA

PROJECT TYPE: Skill Center
FISCAL YEAR: 1982
LOCATION: Springfield R-12 Public Schools
PRIME SPONSOR: Balance of State City of Springfield 1% Special Grants

OCCUPATIONAL AREA:	CLERICAL	AUTO MECH.	WELDING	FOOD MANAGEMENT	DIESEL MECH.	TOTAL
TRAINING	59,666.	38,071.	44,771.	38,071.	49,367.	229,946.
SALARIES	49,254.	30,310.	30,310.	30,310.	30,310.	170,494.
FRINGES	3,599.	3,148.	3,148.	3,148.	3,148.	16,191.
SUPPLIES	4,220.	2,020.	8,720.	2,020.	2,420.	19,400.
OTHER	2,593.	2,593.	2,593.	2,593.	13,489.	23,861.
SERVICES	4,122.	4,122.	4,122.	4,122.	4,122.	20,610.
SALARIES	3,582.	3,582.	3,582.	3,582.	3,582.	17,910.
FRINGES	340.	340.	340.	340.	340.	1,700.
OTHER	200.	200.	200.	200.	200.	1,000.
ADMIN. (PRORATED)	18,060.	18,060.	18,060.	18,060.	18,060.	90,300.
TOTAL	81,848.	60,253.	66,953.	60,253.	71,549.	340,856.
ADJUSTED TOTAL (MINUS ADMIN.)	63,788.	42,193.	48,893.	42,193.	53,489.	250,556.
NUMBER OF SLOTS	40	16	18	25	16	115
NUMBER SERVED	100	40	45	62	40	287
COST PER NO. SERVED	638.	1,055.	1,087.	681.	2,392.	873.
POSITIVE TERM.	39/66.10	16/94.12	15/83.33	16/64	28/96.55	134/74.44
COST PER POS. TERM.	1,636.	2,637.	3,260.	2,637.	3,417.	2,198.
ENTER EMPLOY.	29/49.15	15/88.24	14/77.77	16/64	28/96.55	113/62.77
COST PER ENT. EMPL.	2,200.	2,813.	3,492.	2,637.	3,417.	2,456.

For comparison purposes, the significant training cost results are costs per number, cost per positive termination, and cost per entered employment.

The cost per number served provides a comparison of a cost per training slot. This is a significant figure due to the relationship between the total skill center expenditures and the number of trainees served. In 1981-1982, the cost per number served as compared to the other Balance of State Skill Centers is as follows:

Springfield	Sikeston	Columbia
$873	$1,028	$1,403

The cost per positive termination is based on a ratio of expenditures per trainee who successfully completes his/her training. This statistic implies efficiency in persistence to graduation. The comparison among the other Balance of State Skill Centers is as follows:

Springfield	Sikeston	Columbia
$2,198	$2,373	$2,715

The cost per entered employment ratio would also indicate Springfield training efficiencies. Again comparison between and among skill centers is risky, but could be used as baseline data. The cost per entered employment as compared to the other Balance of State Skill Centers is as follows:

Springfield	Sikeston	Columbia
$2,456	$2,597	$3,279

Taken in total, the cost comparisons imply greater training efficiency in the Springfield Skill Center, when compared to the other Balance of

State Skill Centers. These indications should only be considered trends and be reviewed in subsequent fiscal years for more definitive cost analysis of competency-based instruction.

GRADUATE PLACEMENT AND JOB RETENTION

When competency-based instruction is introduced one wonders "why a change" if the current curriculum appears to be successful. After a thorough evaluation of program objectives and searching of packaged materials used by instructors, one begins to realize that many times the two do not coincide.

Through unbiased self-evaluation of curriculum by instructors while developing CBI, all of the skill areas have disclosed room for curriculum improvement not only in skill additions or deletions, but a need for substantiated documentation of accountability and validity of what they were doing. As evidenced and referenced by the Tri-Annual Review, lesson plan development was weak and by further development of curriculum this problem would be addressed. Having specific course objectives is not always enough. The skill center staff found that theirs were many times very general. By defining performance outcome specifically, the trainee knows exactly what he/she has to do to become a qualified skilled person on an entry-level position. This clarification can and will make a dramatic impact on your skill program as a positive coercion between trainee and industry by means of the instructor. They found that many times instructors teach what they know, not what the job market is demanding at the present time.

The goal of the entire skill center was to become a learning institution that met the needs of our community--not the past experience of the institution. Professional growth has been evidenced, even though many times it has been painful. Awareness is the clincher, and adaptation to today's expectations have left all involved spinning. The staff agrees that the communication between all sectors involved in the project have enhanced placement and retention opportunities for their trainees--this being the ultimate educational goal.

Problems of trainee motivation are more likely to result from the way learning is organized rather than from a simple unwillingness of trainees to work harder. It is true that word gets around concerning the type of educational program offered by the skill center, its quality, its placement and retention. The implementation of curriculum change in our educational programming and practice have made our skill center responsive to the needs of the population served and the current labor market demands.

Factors leading to improved placement and retentions are:

- A systematic management of educational facilities and resources.
- Contrast means of weighing the products of our program against goals of the program.
- Open communication between administration/staff, instructors/trainees, instructors/advisory committees, and school/community.
- Occupational program involves the application of cognitive, motor, and perceptual abilities in unique combinations that result in skilled job performance.
- Focus on process and product.
- Professional expertise of staff and advisory committee to predict trainee outcomes compared to job-related skills.

- Curriculum geared toward industry's innovations, priorities, and direction.
- Immediate feedback given to trainees at critical points in the learning process.
- School dedication to consistent job training that is very specific and goal/success oriented.
- High quality of instruction, self-paced learning materials aimed at performance outcomes that promote efficient classroom and time management.

Once a trainee is informed of the expectations and performance outcomes of the skill area to be entered, success appears eminent. The work world demands positive attitudes, consistent attendance, and a demonstrated level of performance of skills not only to acquire a job but to keep one. These affective domains of learning are intertwined into our curriculum to produce a skilled worker that is stable and dedicated to his/her job.

There appears to be a speculated correlation between trainee performance while in skill training and job performance after program completion. Instructor observation in conjunction with documentation of trainee placements points out this assumption. Once the CBI curriculum is complete, the instructors anticipate to document if trainee's progress during skill development does or does not affect his/her placement and retention of employment. This will be the criteria used to evaluate success of the results of CBI implementation.

Competency-Based Instruction, once developed, appears to promote a clear course of study that affects placement and retention. Defining program competencies validated by industry, informing trainees of expected performance outcomes and information relating to today's work force gives them a step-by-step training program. When instructional objectives are reinforcement by a sophisticated delivery system that utilizes hands-on experience, rather than information learned, it produces competent, entry-level employees that are and will continue to service our community.

MANAGEMENT OF TRAINEE-INSTRUCTOR TIME

The management of time is of crucial importance due to the limited time-allotments allowed trainees to learn and develop skills needed to become a productive worker in today's rapidly changing and competitive world. An 18-24 week skill training program, divided into five day-six hour work weeks, points out that skill training goals and outcomes must be clearly defined and time-lines will not allow for poor trainee attitude or performance. In other words, the trainee becomes responsible for what and how well he/she performs.

Individualized instruction must be supported by instructor's organization or curriculum. To facilitate our open-entry/open-exit program, the instructors assess each trainee upon program entry and prescribe individualized plans of instruction that will meet his/her needs and goals. By so doing, the instructor becomes a manager of learning, not a manager of instruction. This encourages and supports trainees who may be training for different occupations within the same program (i.e., Auto Mechanic--Brake Repair Mechanic).

One very positive quality of competency-based instruction is the pre/post tests incorporated into instructional packages. The trainees are not only functioning at their appropriate level of learning, but afforded the opportunity to skip over competencies already mastered from prior experience before program entry. Once the trainee is given a printed list of skill competencies and evaluated upon the ones he/she believes to have already mastered, the instructor knows exactly where to begin instruction and can help the trainee devise time-lines to substantiate the progress he/she wants to accomplish during training.

Classroom management is beneficial to the trainee and instructor in that he/she knows where they are and where they have to go. The instructor will have more time to work with individual needs and preparation time will be considerably less, once organized. The instructor (through organization) will know exactly where every trainee is, what type of special help he/she may require, and how long before specific tasks are mastered. Hence, the instructor can make accurate referrals to job placement prospects by referencing validated objective evaluations of competency mastery on specific performance outcomes.

The school, as a public service agency, can promote its skill development training programs by specifically itemizing a list of program expectations. This will promote increased enrollment and industrial recruitment of entry-level graduates. The credibility and prestige of the skill center CETA program can and will be promoted throughout all private industry by a process of aligning forces and sharing concerns and responsibilities for vocational education in our community.

SECTION V

COMPETENCY-BASED INSTRUCTION MATERIALS

V. COMPETENCY-BASED INSTRUCTION MATERIALS

DESCRIPTION OF SKILL AREAS AND ENVIRONMENT

The Springfield CETA Skill Center has five major skill areas now in progress. Classes presently in operation are Auto Mechanics, Diesel Mechanics, Food Management, Welding and two Clerical classes. The skill center is housed in two different facilities. One Clerical class shares the facility of the Adult Basic Education Program and the other classes are housed in the Springfield Willard J. Graff Area Vocational-Technical Center. The latter facility is used in the daytime as a secondary high school vocational training program. Consequently, some of the CETA classes that share shops with the secondary programs hold their classes at night with a post-secondary vocational training program provided as an auxiliary service to the community. The Clerical programs and the Welding program operate on a day schedule, while the Auto Mechanics, Diesel Mechanics, and Food Management programs are at night.

Trainees who do not have a high school diploma or those who score low on the entry test that is given all trainees, will be assigned to not more than two (2) hours of instruction in Adult Basic Education per day. It is possible for the trainee to complete their high school equivalence test and receive their GED diploma while in training in a specific skill area.

Trainees who request extra assistance with English or Math or require brush-up on specific academic skills that pertain to developing skill performance have the option of a resource tutor. The English and Math tutors go into the skill areas and work with trainees who want and need their assistance. This service provides individualized instruction to trainees most in need of improving deficient prerequisite skills in academic areas required by industry such as reading, communication skills, multiplication, etc. Often trainees require only a brief review due to lack of practice while in other instances the "basics" were never mastered. This allots time for the skill instructors to concentrate on specific job competencies.

Tutors work with trainees according to the prerequisite order of criteria as follows:

- Score below 9.5 on the Test of Adult Basic Education Entrance Exam, are not in CETA Adult Basic Education classes, but attend a CETA skill class.
- Score below 9.0 on the Test of Adult Basic Education Entrance Exam, but are attending CETA Adult Basic Education and a skill class.
- Score below 9.5 on the Test of Adult Basic Education Entrance Exam, are working toward a GED and attend a CETA skill and Adult Basic Education class.
- Are referred by CETA skill instructors.

Tutors' competencies were developed with the involvement of skill instructors and their advisory committees. Due to the fact that tutors focus on trainees' individualized needs over such a broad spectrum of academic materials and curriculum, the competency list is never-ending and will be added to as necessary or the demand is made for a particular learning experience.

Competencies were developed by a combination of brainstorming and by competencies already being or had been used by tutors. A list of competencies was taken to each skill instructor. They were asked to add or delete to the list and then put the competencies into a prioritized order of importance for their class. A revised competency list was based on the instructor's feedback. Each instructor was given a revised competency list to be added to or deleted from by their advisory committee. A task analysis by class was then finalized.

Competencies were divided into two categories: a) Primary Competencies which blanketed all classes, and b) Secondary Competencies which applied to specific skill areas such as Trigonometry used in Machine Shop but not in Food Management, or Business Numbers used in Advanced Clerical but not with Auto Mechanics.

Since many secondary competencies overlapped, a chart was designed to give a visual account depicting which competencies were necessary for each skill area. The instructors were given a list of all primary and secondary competencies and a chart for their approval after revision. A list of resource materials, to be used to acquire the acquisition of competencies was made for reference. A readibility was done on all skill textbooks and manuals as an aide in adapting the materials to each trainee's need if necessary or identifying at what level of reading each trainee should be expected to comprehend written material in order to understand his/her texts.

EXPLANATION OF DIFFERENT DELIVERY SYSTEMS REFLECTED IN INSTRUCTIONAL UNITS

There are three (3) distinct educational approaches reflected when reviewing the instructional analysis of this model. Because of different delivery systems used by instructors, the format used was and had to be flexible. The basic format listed "Skills" (what the trainee must be able to do) and "Related Information" (what the trainee must know before performing the skill). Originally, each information lesson plan was lecture-oriented and skill lesson plans were a step-by-step procedure of a specific task that the instructor demonstrated to trainees. The trainees then practiced the skill procedure until performance coincided with the anticipated performance outcome and then mastery of learning was demonstrated by evaluation of stated objectives.

The premise established by these definitions was logical but upon development of the individual class instructional analysis, variation of program formats became obvious, thereby leading to this explanation of differences and variations of definition. All of the "Information Topics" used in the instructional analysis were employed by informational lessons that related directly to the skill. However, the skill topics were sometimes called "Skills" (demonstration lesson plans), but also referred to as "Manipulative Skills" or "Skilled Activities."

The Clerical instructors found that they already had many instructional packaged materials in use. For them to demonstrate such items as typing a letter or setting up a bookkeeping system appeared impractical. They called their skills "Manipulative Skills," which were devised as performance outcomes, not demonstration lesson plans followed by performance outcomes.

The Diesel instructor gave an instructional lesson, then from these lessons sent trainees to the shop and supervised procedures he had outlined in the information lesson plans, thereby giving no demonstration lesson. The "Skilled Activity" was the result of an informational lesson plan and trainee practice of steps of procedure assisted by instructor, with a final evaluation to measure performance outcomes of skill mastery.

You will discover when developing Competency-Based Instruction that your instructors will have many different ideas and techniques of teaching their skill. Many will be outstanding, but the Curriculum Specialist needs to insist that the basic format be followed, thus showing consistency throughout the entire curriculum of the skill center. CBI, in such a systematic and accountable format, will insure the ultimate in performance measurement. The trainee's ability to perform important job-related tasks in an actual job setting which emphasizes organization and high quality self-paced learning materials, will cut training time in half resulting in trainees mastering twice as many tasks in half the time as a traditional approach of teaching vocational education.

MATERIALS FOR THE PROJECT

The following material has been compiled and developed by each skill instructor with the assistance and guidance of their advisory committee and the Curriculum Specialist.

This model contains a complete job description, task analysis, and instructional analysis for each skill area including the supplemental basic skill material provided by the tutors. Also, there are representative lesson plans for each skill area. The skill center continues to learn, as will you, while developing, editing, and implementing curriculum. Hopefully, the efforts put forth by this staff will, at least, give you an idea of where to begin, how to proceed, and what to expect when developing your Competency-Based Curriculum.

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AUTO MECHANICS

JOB DESCRIPTIONS

TITLE	DOT NUMBER	JOB DESCRIPTION
Auto Mechanic	620.261-010	Repairs and overhauls automobiles and pickups: Examines vehicle and discusses with customer or other mechanic (i.e. shop foreman) nature and extent of malfunction. Plans work procedures using technical manuals and experience. Raises vehicle, using hydraulic jack or hoist, to gain access to mechanical units bolted to underside of vehicle. Removes unit, such as engine, transmission or differential using wrenches and hoist. Disassembles unit and inspects parts for wear using micrometers, calipers, and thickness gages. Repairs or replaces parts such as pistons, rods, gears, valves and bearings using mechanic's handtools. Overhauls or replaces carburetors, generators, distributors, starters, and pumps. Rewires ignition system, lights and instrument panel. Installs and adjusts brakes, replaces shock absorbers, ball joints, steering parts. Replaces and adjusts headlights, installs and repairs accessories such as heaters, mirrors, windshield wipers and wiper motors, etc.
Brake Repair Mechanic	620.281-026	Repairs and overhauls brake systems in automobiles and pickups, using power bleeder, hand tools, jacks, calipers, dial indicators, hoses, and micrometers. Replaces brake shoes or brake pads, rebuilds wheel cylinders, calipers, and master cylinders. Bleeds brakes and adjusts brakes, checks drums or rotors for wear and damage. Checks brake fluid level for leaks in lines or hoses.
Carburetor Mechanic	620.281-034	Repairs and adjusts automobile and pickup carburetors: Disassembles, cleans, and inspects parts and repairs or replaces parts as needed. Assembles, installs, and adjusts carburetors using mechanics hand tools, emission tester, tachometer, and technical manuals. Also checks filter, lines, pumps and tanks as required.
Front-End Mechanic	620.281-038	Inspects and repairs automobile and pickup suspension and steering systems such as ball joints, tie rod ends, connecting links, pitman arms, idler arms, control arm bushings using mechanics hand tools, spring compressor, impact tool, hydraulic jack, and technical manuals.

Transmission Mechanic	620.281-062	Repairs manual and automatic transmissions in automobiles and pickups: Raises vehicle, using jacks or hoists, and removes transmission using mechanics hand tools. Disassembles transmission unit and replaces broken or worn parts, such as bands, gears, seals, and valves. Adjusts bands and gears as required using mechanics hand tools and special tools for automatic transmissions. Installs transmission and adjusts linkage as required, and road tests vehicle to check for proper operation. Repairs wheel bearings, axle seals, replaces broken axles. Installs and adjusts ring and pinion. Installs and adjusts spyder gears. Installs pinion and carrier bearings and pinion seals.
Tune-Up Mechanic	620.281-066	Tunes automotive engines to insure efficient operation: Removes spark plugs, using hand tools. Cleans electrodes in sandblasting machine, sets spark plug gap with feeler gauge, and replaces or installs new spark plugs. Inspects distributor breaker points for wear and pits, using feeler gauge, and replaces or resets points. Observes ignition timing, using timing light, and adjusts timing, using hand tools. Adjusts carburetor as required using fuel analyzer, vacuum gauge, oscilloscope, and tachometer. Adjusts valve tappets using hand tools and feeler gauge. Replaces defective coils, condensor, and electrical connectors. Checks electronic ignition using ignition tester and adjusts or replaces parts as required. Adjusts and repairs fan belts and fuel or water pumps.
Working Conditions		Generally mechanics work indoors in modern, well-ventilated, lighted, and heated shops. They frequently work with dirty and greasy parts, and in awkward positions. Minor cuts and bruises are common.
Salary Range		Earnings will vary depending upon the shop and the mechanic's ability and speed. The earnings will be from around $3.50 per hour to as much as $9.00 per hour. A commission is given in some shops on the labor part of the bill, and the mechanic will get a percentage of the labor plus a base salary. This gives a mechanic more drive when extra money is possible.

TASK ANALYSIS

AUTO MECHANICS

1. Inspect and repair drum brakes system.
2. Inspect and repair disc brakes system.
3. Inspect and replace clutch.
4. Remove, repair and replace standard transmission.
5. Remove, repair and replace automatic transmission.
6. Remove, repair and replace drive line.
7. Remove, repair and replace rear end.
8. Inspect and repair valves.
9. Remove, repair and replace engine.
10. Tune engine.
11. Test, remove and repair cooling system.
12. Remove, repair and replace fuel system.
13. Remove, repair and replace charging system.
14. Remove, repair and replace starting system.
15. Test and replace battery.
16. Inspect, repair and replace instrument panel.
17. Inspect, repair and replace suspension system.
18. Remove, repair and replace gear box.
19. Remove, repair and replace steering column.
20. Inspect, repair and charge air conditioner system.

TASK ANALYSIS

AUTO MECHANICS

Brake System

1. Inspect and repair drum brakes system.
2. Inspect and repair disc brakes system.

Power Train

1. Inspect and replace clutch.
2. Remove, repair and replace standard transmission.
3. Remove, repair and replace automatic transmission.
4. Remove, repair and replace drive line.
5. Remove, repair and replace rear end.

Engine Rebuild

1. Inspect and repair valves.
2. Remove, repair and replace engine.

Tune-Up

1. Tune engine.

Cooling System

1. Test, remove and repair cooling system.

Fuel System

1. Remove, repair and replace fuel system.

Electrical System

1. Remove, repair and replace charging system.
2. Remove, repair and replace starting system.
3. Test and replace battery.
4. Inspect, repair and replace instrument panel.

Suspension and Steering System

1. Inspect, repair and replace suspension system.
2. Remove, repair and replace gear box.
3. Remove, repair and replace steering column.

Accessories

1. Inspect, repair and charge air conditioner system.

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Brake Systems

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Operation of the Master Cylinder
	2. Operation of the Wheel Cylinder
	3. Operation of the Springs, Shoes, and Adjusters
4. Remove, Inspect, and Repair a Master Cylinder	
5. Remove, Inspect, and Repair a Wheel Cylinder	
6. Remove, Inspect, and Replace Brake Shoes	
	7. Operation of the Master Cylinder
	8. Operation of the Caliper
	9. Operation of the Proportioning Valve
10. Remove, Inspect, and Repair a Master Cylinder	
11. Remove, Inspect, and Repair a Caliper	
12. Remove, Inspect, and Replace Brake Pads	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Power Train

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	1. Purpose and Operation of the Clutch
	2. Adjustment of the Clutch
3. Remove, Inspect, and Replace a Clutch; Adjust a Clutch	
	4. Operation of a Standard Transmission
	5. Purpose and Operation of the Synchronizer
6. Remove, Inspect, and Repair a Standard Transmission	
	7. Operation of a Torque Converter
	8. Operation of the Valve Body and Governor
	9. Clutch and Band Operation
	10. Operation of the Planetary Gears
11. Service an Automatic Transmission	
12. Testing the Line Pressure	
13. Remove an Automatic Transmission	
14. Inspect and Repair an Automatic Transmission	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Power Train (continued)

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	15. Operation of the Drive Line
	16. Purpose of the U-Joints and Slide Collar
17. Remove, Repair, and Replace a Drive Line	
	18. Operation of the Rear End
	19. Purpose of the Ring and Pinion
	20. Purpose of the Spyder Gears
21. Remove, Repair, and Replace the Spyder Gears	
22. Remove, Inspect, and Repair an Axle Bearing and Seal	
23. Remove, Inspect, and Replace the Ring and Pinion	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Engine Rebuilding

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	1. Purpose of the Valves
	2. Operation of the Valve Train
3. Adjust the Rocker Arms	
4. Remove, Inspect, and Grind Valves	
	5. Theory of a Four-Stroke Engine
	6. Construction and Purpose of the Engine Parts
	7. Engine Removal
8. Engine Disassembly	
	9. Special Measuring Tools
10. Check a Crankshaft for Wear	
11. Check Cylinders for Wear	
12. Engine Reassembly	
13. Engine Installation	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Tune-Up

Skills: What the Student Must Be Able To Do	**Related Information:** What the Student Must Know
	1. Automotive Distributor
	2. Emission Control Systems
	3. Special Tools and Equipment for Tune-Up
4. Remove, Adjust, and Install Spark Plugs	
5. Remove, Install, and Adjust Points and Condensor	
6. Remove, Test, and Replace HEI Distributor	
7. Adjust Ignition Timing	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Cooling System

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Purpose of the Cooling System and Parts
	2. Construction and Operation of Radiators and Pressure Caps
3. Test, Remove, and Repair a Radiator	
	4. Hoses, Clamps, and Drive Belts
	5. Construction and Operation of Thermostats and Water Pumps
6. Inspect, Remove, and Replace Water Pump, Hoses, and Belts	
7. Remove, Test, and Install Thermostat	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Fuel System

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Purpose of the Fuel System
	2. Types of Fuel Pumps
	3. Purpose and Operation of the Carburetor
4. Remove, Inspect, and Replace a Fuel Pump	
5. Inspect and Replace Fuel Lines and Hoses	
6. Remove and Replace a Fuel Tank	
7. Remove, Repair, and Replace a Carburetor	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Electrical Systems

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Operation of the Voltage Regulator
	2. Operation of the Alternator
3. Test and Replace a Voltage Regulator	
4. Remove, Repair, and Replace an Alternator	
	5. Purpose and Operation of the Solenoid
	6. Purpose and Operation of the Starter
7. Remove, Test, and Replace a Solenoid	
8. Remove, Repair, and Replace a Starter	
9. Remove and Replace a Starter Drive	
	10. Construction of the Battery
	11. Special Tools to Test and Charge a Battery
12. Test and Replace a Battery	
	13. Operation of Instrument Panel Gauges and Lights
	14. Purpose and Construction of the Speedometer

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Electrical Systems (continued)

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	15. Fuse Panel Operation
16. Remove, Test, and Replace a Fuse	
17. Remove, Test, and Replace Panel Gauges	
18. Test and Replace Speedometer	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Suspension and Steering Systems

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Operation of the Suspension System
	2. Types of Suspension Systems
3. Remove, Test, and Replace a Shock	
4. Inspect, Remove, and Replace Control Arm Bushings and Ball Joints	
5. Inspect and Replace Tie Rods, Idler Arm, and Pitman Arm	
6. Inspect and Replace Coil Springs	
7. Inspect, Remove, and Replace Torsion Bar	
	8. Construction and Operation of the Gear Box
	9. Types of Gear Boxes
	10. Construction and Operation of a Power Steering Pump
11. Adjust a Gear Box	
12. Inspect and Replace Power Steering Hoses	
13. Remove, Repair, and Replace a Gear Box	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Suspension and Steering Systems (continued)

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
14. Remove, Repair, and Replace a Power Steering Pump	
	15. Construction of the Steering Column
	16. Types of Steering Columns
17. Remove, Repair, and Replace Turn Signal Switch	
18. Remove, Repair, and Replace Shift Tube	
19. Remove and Replace Steering Shaft and Bearings	
20. Remove, Repair, and Replace Tilt Wheel	

INSTRUCTIONAL ANALYSIS

Course: Auto Mechanics

Unit: Accessories

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	1. Operation of the Air Conditioner
	2. Types of Freon and Oil
3. Charge an Air Conditioner	
4. Inspect and Replace a Compressor Clutch	
5. Inspect, Remove, and Replace Air Conditioning Hoses	

LESSON PLAN # 1

LESSON PLAN FORMAT

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 Cooling System

(UNIT TITLE)

SCOPE OF UNIT: This unit will familiarize the student with the various types of cooling systems, the operation and purpose of the cooling system components, inspection, maintenance and repair procedures.

INFORMATION TOPIC # 1 OR DEMONSTRATION # ______

Purpose of the Cooling System and Parts

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. List two types of cooling systems.
2. List three purposes of the cooling system.
3. List three reasons why the engine should not run too cool.
4. List components of an air-cooled engine that are responsible for heat discipation.
5. List components of the air-cooled engine and their operation.
6. Explain direction of coolant flow.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Chalkboard
Handout # 1-"Cooling System Components" (liquid cooled)
Handout # 2-"Cooling System Components" (air cooled)

	(Name)	(Date)	Special Learning Features For:
Written By:	G. Lee	5/8/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Stockel, Martin W. Auto Mechanics Fundamentals. South
Holland, IL: Goodheart-Willcox, 1969. Chapter 4,
pages 75-90.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Without the cooling system working properly, the internal combustion engine would melt some parts and pistons would swell to a point that the engine would stop running. The complexity of the cooling system varies from simple to quite complex, depending on the type of automobile and the type of system used. When kept in proper working order, the cooling system does its job effectively. Today's mechanic must understand the operation and importance of the cooling system.

LESSON PLAN # 1

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

INFORMATION TOPIC # 1 (Technical - General - Guidance)

TITLE: Purpose of the Cooling System and Parts

OUTLINE:

I Purpose of the Cooling System

- A. Remove Surplus Heat
- B. Maintain Efficient Operating Temperature
- C. Bring Engine to Operating Temperature Quickly

Interaction Item # 2

II Types of Cooling Systems

- A. Liquid Cooled
- B. Air Cooled

Interaction Item # 1

III Disadvantages of Running Too Cool

- A. Poorer Engine Performance
- B. Poorer Fuel Economy
- C. Greater Engine Wear
- D. Higher Exhaust Emissions

Interaction Item # 3

IV Cooling Systems Requirements

- A. One-Third of the Combustion Heat Energy Must Be Removed by Cooling System
- B. One-Third of the Combustion Heat Leaves Through Exhaust System
- C. One-Third of the Combustion Heat Energy Used to Drive Vehicle

V Principles of Operation

A. Liquid Cooled (see Handout # 1)

1. Coolant absorbs heat from engine.
2. Water pump circulates coolant.
3. Radiator dissipates coolant heat.
4. Thermostat controls engine temperature.
5. Direction of coolant flow.
    a. With thermostat closed
        1. Water pump.
        2. Block.
        3. Head.
        4. Water by-pass.

Interaction Item # 5

    b. With thermostat open
        1. Water pump.
        2. Block.
        3. Head.
        4. Thermostat.
        5. Upper radiator hose.
        6. Radiator.
        7. Lower radiator hose.

Interaction Item # 4

B. Air Cooled (see Handout # 2)

1. Cooling fins - transfer and dissipate engine heat.
2. Blower - circulates air over engine.
3. Engine shrouds - control air direction.
4. Thermostat - regulates amount of air circulated.
5. Comparison to liquid cooled engine.
    a. Higher operating temperature.
    b. Noisier operation - no water jackets to deaden sound.
    c. Never "lug" engine - causes the engine to overheat.

Interaction Item # 6

VI Summary and Conclusion

A. Purpose of the Cooling System

B. Types of Cooling Systems

C. Disadvantages of Running Too Cool

D. Cooling System Requirements

E. Principles of Operation

F. Today's mechanic must have a great deal of knowledge about the liquid cooling system as well as the air cooled units in order to test and repair cars and pickups of today and tomorrow.

LESSON PLAN # 1

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System - Purpose of the Cooling System & Parts
(Unit Title)

INFORMATION TOPIC # 1 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are the two types of automotive cooling systems?
2. What are the three purposes of the cooling system?
3. What are some advantages of operating an engine at normal operating temperatures as opposed to running it too cool?
4. Which radiator hose is the inlet and which is the outlet?
5. How does the coolant circulate in the engine when the thermostat is closed?
6. On an air-cooled engine what feature is designed into the engine cylinders and heads to dissipate heat?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Inspect the cooling system of a training aid engine with special attention given to the direction of coolant flow and the by-pass passage used.

LESSON PLAN # 1

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 **—** Cooling System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Purpose of the Cooling System and Parts

Directions: Answer the following questions as directed.

1. List three jobs the cooling system must perform.

   1. ______________________________
   2. ______________________________
   3. ______________________________

2. List the two types of cooling systems.

   1. ______________________________
   2. ______________________________

3. When the thermostat is in the closed position, coolant is allowed to circulate within the engine by the use of the ______________________________.

4. In your own words explain how the coolant flows with the thermostat open.

   ____
   ____
   ____
   ____
   ____

5. List four reasons why the engine should not run too cool.

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

6. What part of the air-cooled engine is responsible for heat dissipation?

____

7. List the parts of the air-cooled engine (components for cooling).

____

____

____

____

____

____

8. What controls flow of the air in the air-cooled engine?

____

9. What part of the air-cooled engine is responsible for cooling at an idle?

____

LESSON PLAN # 2

LESSON PLAN FORMAT

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 Cooling System

(UNIT TITLE)

SCOPE OF UNIT: This unit will familiarize the student with the various types of cooling systems, the operation and purpose of the cooling system components, inspection, maintenance and repair procedures.

INFORMATION TOPIC # 2 OR DEMONSTRATION # ______

Construction and Operation of Radiators & Pressure Caps

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. State three purposes of the radiator.
2. Name the two types of radiators and identify their parts.
3. List four methods of repairing a radiator.
4. State the purpose of the radiator pressure cap & describe how it operates.
5. State the purpose of the coolant recovery system.
6. State three precautions to be taken when removing the pressure cap from a hot engine.
7. List the steps of procedure for cooling down an overheated engine.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Handout # 1: "Typical Downflow Radiator"
2. Handout # 2: "Types of Radiator Core Construction"
3. Handout # 3: "Coolant Recovery System"
4. Handout # 4: "Radiator Cap"
5. Radiators of both types or vehicles with both types of radiators.
6. Pressure caps - with & without pressure release feature.
7. Construction and Operation of Radiators and Pressure Caps.

	(Name)	(Date)	Special Learning Features For:
Written By:	G. Lee	7/2/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Stockel, Martin W. Auto Mechanics Fundamentals. South Holland, IL: Goodheart-Willcox, 1969. Chapter 4, pages 79-80.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The radiator and pressure cap are the most commonly thought of items when we speak of the cooling system. In this lesson we will study the construction of the radiator, how the cooling system operates under pressure to increase cooling efficiency, and how the coolant recovery system functions.

LESSON PLAN # 2

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

INFORMATION TOPIC # 2 (Technical - General - Guidance)

TITLE: Construction & Operation of Radiators & Pressure Caps

OUTLINE:

I Radiator

A. Purposes

1. To remove heat from engine coolant
2. To remove heat from automatic transmission fluid
3. Bring engine to operating temperature quickly

Interaction Item # 1

B. Types

1. Downflow (vertical)
2. Crossflow (horizontal)

Interaction Item # 2

C. Construction (see Handout # 1)

1. Tanks
2. Core tube construction (see Handout # 2)
    a. Tube type
    b. Cellular type
3. Inlet and Outlet
4. Automatic transmission cooler
5. Filler neck

D. Operation - coolant gives up heat to radiator and dissipates into incoming air

E. Methods of Repairing Radiators

1. Solder minor leaks
2. Cut and solder leaking tube
3. Recore
4. Replace
5. Chemical stop - leak additives -- not recommended

Interaction Item # 3

II Coolant Recovery System (see Handout # 3)

A. Purpose

1. To prevent coolant loss when coolant expands
2. Allows more coolant in system

Interaction Item # 4

B. Operation

1. Radiator is kept completely full at all times
2. Recovery tank allows room for expansion
3. Coolant is drawn into radiator when it cools and contracts

Interaction Item # 5

C. Service Tips

1. Always add coolant to recovery tank
2. Do not remove radiator cap unless necessary
3. Keep coolant recovery hose tight and free of cracks

III Pressure Cap

A. Purpose

1. Keeps system under pressure
2. Allows higher, more efficient operating temperature

B. Operation (see Handout # 4)

1. Increasing system pressure raises coolant boiling point
2. One psi increase = 3 degrees increase in boiling point
3. Example: At 15 psi operating pressure, boiling point of plain water will be raised to 257 degrees F.

   15 psi x 3 degrees = 45 degrees increase
   212 degrees (boiling point under no pressure) + 45 degrees = 257 degrees

Interaction Item # 6

C. Precautions when Removing Cap from Hot Engine

1. Stand to the side of the radiator
2. Always place a rag over cap
3. Loosen cap to safety catch to relieve pressure

D. Procedure for Cooling Down an Overheated Engine

1. Shut off engine
2. Raise hood
3. Let engine cool on its own before removing cap
4. Remove cap; start engine and fill with water

Interaction Item # 7

IV Summary and Conclusion

A. Radiator

B. Coolant Recovery System

C. Pressure Cap

D. We have discussed many aspects of the radiator and its function such as purpose, types, construction, coolant, recovery and repair procedures. The most important thing to remember is that an overheated engine can result in an injured mechanic. So -- play it safe when cooling down an overheated engine.

LESSON PLAN # 2

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit Title)

INFORMATION TOPIC # 2 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are the purposes of the radiator?
2. What are the two types of radiator designs?
3. What are the methods of repairing a radiator?
4. What is the purpose of the coolant recovery system?
5. Where should coolant be checked and added on an engine with coolant recovery? Why?
6. What is the purpose of the pressure cap?
7. Name the steps of procedure for cooling an overheated engine.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Show the class both types of radiator construction.
2. Inspect a vehicle with a coolant recovery system.
3. Pass around various examples of radiator pressure caps.
4. Demonstrate the method of removing pressure cap from a hot engine.

LESSON PLAN # 2

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Construction and Operation of Radiators & Pressure Caps

Directions: Answer the following questions as directed:

1. Name the two types of radiators.

   a. ____________________ b. ____________________

2. State three purposes of the radiator.

   a. ____

   b. ____

   c. ____

3. List four methods of repairing a radiator.

   a. ____________________

   b. ____________________

   c. ____________________

   d. ____________________

4. The purpose of the coolant recovery system is to:

   a. Allow the radiator to operate completely full at all times.
   b. Prevent loss of coolant due to coolant expansion.
   c. Provide a reserve of coolant to fill radiator after coolant contracts.
   d. All of the above.

5. Which of the following is NOT a function of the pressure cap?

   a. Brings engine to operating temperature quickly.
   b. Allows cooling system to operate under pressure.
   c. Vents excessive pressure beyond its rated pressure.
   d. Allows coolant to enter radiator from recovery tank when coolant contracts.

6. State three precautions to be taken when removing a pressure cap from a hot engine.

   a. ____

   b. ____

   c. ____

7. The first step of the procedure for cooling down an overheated engine is ___________.

   a. Remove pressure cap.
   b. Start engine and fill with water.
   c. Shut down engine.

LESSON PLAN # 3

LESSON PLAN FORMAT

COURSE TITLE/NO Auto Mechanics

UNIT # 5 Cooling System

(UNIT TITLE)

SCOPE OF UNIT:

This unit will familiarize the student with the various types of cooling systems, the operation and purpose of the cooling system components, inspection, maintenance, and repair procedures.

INFORMATION TOPIC # ______ OR DEMONSTRATION # 3

Test, Remove, and Repair A Radiator

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper working conditions with 100% accuracy:

1. Pressure test the radiator on the vehicle to locate the leak.
2. Drain and remove the radiator for repair.
3. Clean and repair the radiator using proper steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Hand pressure pump
Gas welding equipment
Acid core solder
Work bench
Screwdriver
1/2" combination wrench
7/16" combination wrench
9/16" combination wrench
Water bucket
Wire brush (clean)

	(Name)	**(Date)**	**Special Learning Features For:**
Written By:	G. Lee	5/13/82	Individual or Small
Instructional Delivery System By:	90		Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Motor Auto Repair Manual; Professional Service Trade Edition.
New York, NY: Motor Publishing.

(Edition used depends upon year and model of vehicle)

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

All internal combustion engines have a cooling system. The liquid system is quite complex and leakage is common. A leaking system can cause an engine to melt if proper maintenance is not used. A good mechanic will be called upon several times during his career to repair a leaking radiator. Today we will cover proper steps of procedure to test and repair a leaking system.

LESSON PLAN # 3

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

DEMONSTRATION # 3 **(MANIPULATIVE OPERATIONS)**

TITLE: Test, Remove, and Repair a Radiator

STEPS OF PROCEDURE:

Testing Procedures:

1. Remove pressure cap and check to see that coolant level is full.
2. Install hand pressure tester.
3. Pressurize to the limit of the pressure.
4. Perform a visual inspection.
5. Locate and mark the leak with chalk.

Removal Procedures:

6. Drain coolant into storage can.
7. Remove the shroud attaching bolts and shroud.
8. Remove upper and lower radiator hoses.
9. Remove transmission cooler lines.
10. Remove radiator attaching bolts and lift radiator out.
11. Place radiator on work bench with leak facing up.

Repairing Procedures:

12. Turn on gas welding equipment.
13. Adjust oxygen gauge to 30 pounds and oxy-acetylene bottle to 5 pounds.
14. Install a # 1 welding tip.
15. Crack oxy-acetylene valve on handle and light with approved striker.
16. Adjust oxygen valve to get neutral flame.
17. Heat area to be soldered.
    Note: Be careful not to burn a hole in radiator.
18. Wire brush area to be soldered.
    Note: This will help in the cleaning process.
19. Reheat area being repaired until acid core solder will melt from the heat of the radiator, not the gas welding unit.
    Note: Acid core solder must be used.
20. Brush area being soldered until clean.
21. Reheat area being repaired and apply solder.
    Note: Watch the flow of the solder. It will be smooth and even.
22. Fill radiator with water.
23. Plug upper and lower outlets.
24. Install hand pressure tester.
25. Apply pressure to radiator cap limit.
26. Inspect for leaks.
27. Install radiator (using steps 1 - 11 in reverse order).

LESSON PLAN # 3

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System - Test, Remove, and Repair A Radiator
(Unit Title)

INFORMATION TOPIC # ______ or DEMONSTRATION # 3

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Where do you find the pressure limit on a radiator?
2. How is the radiator pressurized without the engine running?
3. What welding equipment is necessary to solder a radiator?
4. What is the setting on pressure of gas welding equipment when soldering?
5. What flame is required for soldering?
6. What purpose does the wire brush serve in soldering?
7. What will soldered area look like when properly soldered?
8. What type of solder is used when repairing a radiator?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. In the lab with the proper equipment and checklist, practice inspecting, removing and repairing a radiator.

2. Review interaction items.

LESSON PLAN # 3

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Test, Remove, and Repair a Radiator

Student's Name ____________________

	Yes	No
1. Remove pressure cap and check to see that coolant level is full.		
2. Install hand pressure tester.		
3. Pressurize to the limit of the pressure.		
4. Perform a visual inspection.		
5. Locate and mark the leak with chalk.		
6. Drain coolant into storage can.		
7. Remove the shroud attaching bolts and shroud.		
8. Remove upper and lower radiator hoses.		
9. Remove transmission cooler lines.		
10. Remove radiator attaching bolts & lift radiator out.		
11. Place radiator on work bench with leak facing up.		
12. Turn on gas welding equipment.		
13. Adjust oxygen gauge to 30 pounds and oxy-acetylene bottle to 5 pounds.		
14. Install a # 1 welding tip.		
15. Crack oxy-acetylene valve on handle and light with approved striker.		
16. Adjust oxygen valve to get neutral flame.		
17. Heat area to be soldered.		
18. Wire brush area to be soldered.		
19. Reheat area being repaired until acid core solder will melt from the heat of the radiator, not the gas welding unit.		
20. Brush area being soldered until clean.		
21. Reheat area being repaired and apply solder.		
22. Fill radiator with water.		
23. Plug upper and lower outlets.		
24. Install hand pressure tester.		
25. Apply pressure to radiator cap limit.		
26. Inspect for leaks.		
27. Install radiator (using steps 1 - 11 in reverse order).		

Instructor's Name ______________ Date ______________

LESSON PLAN # 4

LESSON PLAN FORMAT

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 Cooling System

(UNIT TITLE)

SCOPE OF UNIT:

This unit will familiarize the student with the various types of cooling systems, the operation and purpose of cooling system components, inspection, maintenance and repair procedures.

INFORMATION TOPIC # 4 OR DEMONSTRATION # ______

Hoses, Clamps and Drive Belts

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. List the types of hoses used in cooling systems.
2. List three signs of hose deterioration.
3. List the types of hose clamps used in cooling systems.
4. Describe the types of damage that can result from improper belt tension.
5. Describe the method of checking belt tension by hand.
6. List five defects for which a belt should be replaced.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Handout # 1: "Hoses & Clamps"
2. Handout # 2: "Fan Belt Adjustment"
3. Straight, Molded & Accordion Type Radiator Hoses
4. Screw & Snap Type Hose Clamps
5. Snap Type Hose Clamp Pliers
6. Drive Belt
7. Hoses, Clamps & Belts

	(Name)	(Date)	Special Learning Features For:
Written By:	G. Lee	7/6/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Stockel, Martin W. Auto Mechanics Fundamentals. South Holland, IL: Goodheart-Willcox, 1969. Chapter 4, pages 80-82.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The individual components of the cooling system and the heater are connected by one or more types of rubber hose. To assure a water-tight seal at each hose connection and to assure the hoses will stay in place, some sort of hose clamp is necessary. Hoses and clamps will be the topic of our discussion today.

LESSON PLAN # 4

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

INFORMATION TOPIC # 4 (Technical - General - Guidance)

TITLE: Hoses, Clamps and Drive Belts

OUTLINE:

I Types of Hoses (see Handout # 1)

- A. Common Hose - used when bends are required.
- B. Molded or Shaped Hose - designed for specific locations. All new car radiator hoses are molded.
- C. Accordion Type Hose - universal; one hose will fit many applications; will bend sharply.

Interaction Item # 1

II Hose Construction

- A. Rubber and Fabric
- B. Steel Wire Coil in Some Types

III Signs of Hose Deterioration

- A. Cracking
- B. Hardening
- C. Ballooning

IV Types of Hose Clamps (see Handout # 2)

- A. Screw Type

Interaction Item # 2

- B. Snap Type

Interaction Items # 3 & # 4

V Drive Belts

- A. Effects of Improper Belt Tension

Interaction Item # 5

1. Too tight

    a. Premature wear of accessory bearings.
    b. Premature belt wear.

2. Too loose

    a. Noisy belt.
    b. Premature belt wear.
    c. Inoperative accessories.

Interaction Item # 6

B. Checking Belt Tension

1. Tension gauge method.
2. Hand method (see Handout # 3)
    a. Apply firm pressure at longest interval between pulleys.
    b. Belt should deflect about ½ inch.

Interaction Item # 7

C. Belt Inspection

1. Cracking
2. Splitting
3. Fraying
4. Oil soaked
5. Hard glazing

Interaction Item # 8

VI Summary and Conclusion

A. Types of Hoses and Construction

B. Hose Construction

C. Signs of Hose Deterioration

D. Types of Hose Clamps

E. Drive Belts

F. We have covered types of hoses, construction, signs of deterioration and types of clamps, in addition to the results of improper belt tension and methods of testing belt tension. Don't forget to check belts for deterioration each time you adjust tension.

LESSON PLAN # 4

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System - Hoses, Clamps & Drive Belts
(Unit Title)

INFORMATION TOPIC # 4 or DEMONSTRATION # ________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are three types of hose used in the automobile cooling system?
2. What are two types of hose clamps?
3. What are the advantages of the screw type clamps?
4. What are the advantages of the snap type clamps?
5. What tool is used to remove the snap type clamp?
6. What might be the result of an overtight or an undertightened belt?
7. How much should a belt deflect when checking it?
8. What are some of the defects for which a belt should be replaced?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Inspect different types of cooling system hoses and clamps.

LESSON PLAN # 4

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System - Hoses, Clamps & Drive Belts
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Directions: Answer the following questions as directed:

1. List three types of hose used in the cooling system.
   1. ______________________
   2. ______________________
   3. ______________________
2. Name three hose conditions which would indicate hose deterioration.
   1. ______________________
   2. ______________________
   3. ______________________
3. List two types of hose clamps used on cooling system hoses.
   1. ______________________
   2. ______________________
4. When a drive belt is overtightened, the result may be premature wear of accessory ______________________.
5. When a drive belt is undertightened, the result may be ______________________.
   a. Noisy belt operation.
   b. Premature belt wear.
   c. Inoperative or inefficient accessories.
   d. All of the above.

6. Which of the following procedures is correct when checking belt tension by hand?

   a. Apply firm pressure to the longest portion of the belt; should deflect about ½ inch.
   b. Apply firm pressure to the shortest portion of the belt; should deflect 1 inch.
   c. Apply light pressure to longest portion of belt; should deflect about 3/4 inch.
   d. None of the above.

7. List five defects for which a drive belt might be replaced.

   1. ____________________
   2. ____________________
   3. ____________________
   4. ____________________
   5. ____________________

LESSON PLAN # 5

LESSON PLAN FORMAT

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 Cooling System

(UNIT TITLE)

SCOPE OF UNIT:

This unit will familiarize the student with the various types of cooling systems, the operation and purpose of cooling system components, inspection, maintenance and repair procedures.

INFORMATION TOPIC # 5 OR DEMONSTRATION # ________

Construction & Operation of Thermostats and Water Pumps

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Name the two types of thermostats.
2. State the two functions of each thermostat and describe how each one operates.
3. Describe the direction a pellet type thermostat must face when installed in an engine.
4. State the function & identify the major parts of a water pump.
5. State the function of the water by-pass passage.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Handout # 1: "Pellet Type Thermostat"
2. Handout # 2: "Typical Bellows Thermostat"
3. Handout # 3: "Water Pump" (Cross Section)
4. Handout # 4: "Impeller Pump & Housing"
5. Several thermostats of both pellet and bellows design
6. Several examples of different types of water pumps showing the various types of water by-pass passages
7. Heat gun or cigarette lighter for demonstrating thermostat operation

	(Name)	(Date)	Special Learning Features For:
Written By:	G. Lee	7/7/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Stockel, Martin W. Auto Mechanics Fundamentals. South Holland, IL: Goodheart-Willcox, 1969. Chapter 4, pages 76-85.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The thermostat and water pump perform critical functions in the operation of the cooling system. Without the thermostat the engine would operate too cool and performance, economy and engine life would suffer. The water pump insures good circulation of coolant through the system. Let's find out more about how these two components do their job.

LESSON PLAN # 5

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

INFORMATION TOPIC # 5 (Technical - General - Guidance)

TITLE: Construction & Operation of Thermostats & Water Pumps

OUTLINE:

I Thermostat

A. Types

1. Pellet - most common (see Handout # 1).
2. Bellows - air cooled engines mostly (see Handout # 2).

Interaction Item # 1

B. Functions

1. Regulates engine operating temperature.
2. Brings engine to operating temperature quickly.

Interaction Item # 2

C. Construction (see Handout # 1)

1. Pellet type
   a. Pellet
   b. Piston
   c. Return spring
   d. Valve
   e. Frame

2. Bellows type (see Handout # 2)
   a. Bellows
   b. Valve stem
   c. Valve
   d. Bellows support frame

D. Operation (see Handout # 1)

1. Pellet type
   a. Controls coolant circulation.
   b. Wax in pellet expands.

2. Bellows type (see Handout # 2)
   a. Controls amount of air circulating in air-cooled engine.
   b. Gas in bellows expands.

Interaction Item # 3

E. Temperature Ratings of Pellet Type Thermostats

  1. Most rated between 190-195 degrees F.
  2. Operating range - about 20 degrees.

F. Position of Thermostat in Engine - Pellet Must Face Hot Water

Interaction Item # 4

II Water Pump

A. Function - To Circulate the Coolant (see Handout # 3)

B. Parts of Water Pump (see Handout # 4)

Interaction Item # 7

  1. Pump housing
  2. Shaft seals
  3. Shaft bearings
  4. Hub
  5. Impeller shaft
  6. Impeller
  7. Water inlet
  8. Water outlet
  9. Drain hole
  10. Water by-pass

Interaction Items # 5 and # 6

C. Function of Water By-Pass - Allows Coolant to Circulate Inside Engine When the Thermostat is Closed.

Interaction Item # 8

III Summary and Conclusion

A. Thermostat

B. Water Pump

C. We have covered the various types of thermostats, their purpose, their construction and their operation. Also we have discussed the purpose and parts of the water pump and the purpose of the water by-pass system. All component parts of the cooling system must be operating properly to insure safe and efficient operation of a vehicle.

LESSON PLAN # 5

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit Title)

INFORMATION TOPIC # 5 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are two types of thermostats?
2. What are the two purposes of the thermostat?
3. What causes the thermostat to open? To close?
4. What is a common thermostat temperature rating?
5. What engine condition would exist if the thermostat did not open? Did not close?
6. What is the purpose of the water pump?
7. What drives the water pump?
8. What is the purpose of the water by-pass?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Inspect different types of thermostats and water pumps.
2. Using a heat gun, cigarette lighter or a container of hot water, warm a thermostat until it opens.
3. Point out to the class the water pump drain hole wher defective water pump will usually show signs of leakage.

LESSON PLAN # 5

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Construction & Operation of Thermostats & Water Pumps

Directions: Answer the following questions as directed:

1. Name the two types of automotive thermostats.

   1. ______________________ 2. ________________________

2. State the two functions of the thermostat.

   1. ____

   2. ____

3. Which of the following temperature readings is most typical of a pellet type thermostat temperature rating?

   a. 165
   b. 180
   c. 192
   d. 205

4. A 190 degrees F. thermostat should be completely open at

   about ______________________.

   a. 195 degrees F.
   b. 190 degrees F.
   c. 200 degrees F.
   d. 210 degrees F.

5. The pellet type thermostat is always installed with the pellet facing toward the engine block.

   True or False ______________________

6. The purpose of the water pump is to ______________________ the coolant.

7. The water by-pass allows coolant to circulate within the engine when ______________________.

   a. the engine is cold
   b. the thermostat is closed
   c. the thermostat is open
   d. both a and b above

LESSON PLAN # 6

LESSON PLAN FORMAT

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 Cooling System

(UNIT TITLE)

SCOPE OF UNIT: This unit will familiarize the student with the various types of cooling systems, the operation and purpose of cooling system components, inspection, maintenance and repair procedures.

INFORMATION TOPIC # ______ OR DEMONSTRATION # 6

Inspect, Remove & Replace Water Pump, Hoses & Belts

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper working conditions with 100% accuracy:

1. Remove and install a water pump.
2. Remove and install cooling system hoses.
3. Remove and install a variable drive fan.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Drain pan
Wrenches
Hose clamp pliers
Gasket scraper
Torque wrench
Screwdriver

	(Name)	(Date)	Special Learning Features For:
Written By:	G. Lee	7/7/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

"Motor" Auto Repair Manual - Professional Service Trade Edition. New York, NY: Motor Publishing.
(Edition used depends upon year and model of vehicle).

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Today we will learn how to remove and replace the water pump, hoses and the variable drive fan. These are jobs which every auto mechanic performs from time to time. Although every type of automobile is different, we will use a general procedure which can be adapted to most situations.

LESSON PLAN # 6

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

DEMONSTRATION # 6 (MANIPULATIVE OPERATIONS)

TITLE: Inspect, Remove & Replace Water Pump, Hoses & Belts

STEPS OF PROCEDURE:

1. Drain cooling system.
2. Loosen alternator and remove V-belt.
3. Remove fan-to-water pump retaining bolts and remove fan.

   (Note: Store fan assembly in an upright position - same position as it occupies on engine) to prevent fluid leakage.)

4. Remove fan shroud if so equipped.
5. Remove lower radiator hose from water pump.
6. Remove water pump retainer bolts.
7. Lift out water pump.
8. Inspect hoses for cracking.
9. Inspect hoses for hardness.
10. Inspect hoses for ballooning.

    (Note: Some engines have a short water by-pass hose between water pump and intake manifold. It is good practice to replace this hose at this time since it is difficult to do when pump is in place.)

11. Inspect V-belt for signs of wear.
12. Clean all gasket surfaces thoroughly.
13. Inspect for signs of coolant leaks at the pump drain if pump is to be reused.
14. Place gasket sealer on gasket surfaces.
15. Place gaskets in position on pump.
16. Place water pump in position.
17. Put in bolts and tighten uniformly to specifications.
18. Reconnect lower radiator hose to water pump.
19. Reconnect heater hoses if necessary.

    (Note: Place some gasket sealer on heater hoses for easier installation.)

20. Install fan shroud, if used.
21. Install fan.
22. Install and adjust drive V-belt.
23. Fill cooling system with proper coolant.
24. Start engine and check for leaks.
25. Bring engine to operating temperature and recheck coolant level.

LESSON PLAN # 6

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit Title)

INFORMATION TOPIC # ______ or DEMONSTRATION # 6

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

Inspect, Remove & Replace Water Pump, Hoses & Belts

1. What is the procedure for removing the water pump?
2. Why is gasket sealer used when installing heater hoses?
3. For what types of defects should hoses be inspected?
4. How should the thermo clutch fan be stored?
5. Why should the water by-pass hose be replaced when the water pump is removed?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Remove and install water pumps, hoses and belts.

2. Review interaction items with the class.

LESSON PLAN # 6

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Inspect, Remove & Replace Water Pump, Hoses & Belts

Student's Name ____________________

			Yes	No
1.	Drain cooling system.	1.	____	____
2.	Loosen alternator & remove V-Belt.	2.	____	____
3.	Remove fan-to-water pump retaining bolts and remove fan.	3.	____	____
4.	Remove fan shroud if so equipped.	4.	____	____
5.	Remove lower radiator hose from water pump.	5.	____	____
6.	Remove water pump retainer bolts.	6.	____	____
7.	Lift out water pump.	7.	____	____
8.	Inspect hoses for cracking.	8.	____	____
9.	Inspect hoses for hardness.	9.	____	____
10.	Inspect hoses for ballooning.	10.	____	____
11.	Inspect V-belt for signs of wear.	11.	____	____
12.	Clean all gasket surfaces thoroughly.	12.	____	____
13.	Inspect for signs of coolant leaks at the pump drain if pump is to be reused.	13.	____	____
14.	Place gasket sealer on gasket surfaces.	14.	____	____
15.	Place gaskets in position on pump.	15.	____	____
16.	Place water pump in position.	16.	____	____
17.	Put in bolts & tighten uniformly to specifications.	17.	____	____
18.	Reconnect lower radiator hose to water pump.	18.	____	____
19.	Reconnect heater hoses if necessary.	19.	____	____
20.	Install fan shroud, if used.	20.	____	____
21.	Install fan.	21.	____	____
22.	Install and adjust drive V-belt.	22.	____	____
23.	Fill cooling system with proper coolant.	23.	____	____
24.	Start engine and check for leaks.	24.	____	____
25.	Bring engine to operating temperature and recheck coolant level.	25.	____	____

Instructor's Name ____________________

Date ____________________

LESSON PLAN # 7

LESSON PLAN FORMAT

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 Cooling System

(UNIT TITLE)

SCOPE OF UNIT:

This unit will familiarize the student with the various types of cooling systems, the operation and purpose of cooling system components, inspection, maintenance and repair procedures.

INFORMATION TOPIC # ______ OR DEMONSTRATION # 7

Remove, Test & Install Thermostat

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper working conditions with 100% accuracy:

1. Remove and install a thermostat.

2. Test and record the condition of a thermostat.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

- Engine or vehicle
- Heat source
- Container for heating water
- Wrenches
- Drain pan
- Hose clamp pliers
- Screwdriver
- High temperature thermometer
- Torque wrench
- Gasket scraper
- Gasket sealer

	(Name)	(Date)	Special Learning Features For:
Written By:	G. Lee	7/8/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

"Motor" Auto Repair Manual - Professional Service Trade Edition. New York, NY: Motor Publishing. (Edition used depends upon year and model of vehicle).

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

We have already studied how the thermostat works. Today, we will go through the process of removing, testing and installing a thermostat.

LESSON PLAN # 7

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit or Block Title)

DEMONSTRATION # 7 (MANIPULATIVE OPERATIONS)

TITLE: Remove, Test & Install Thermostat

STEPS OF PROCEDURE:

1. Drain radiator.
2. Remove upper radiator hose if necessary.
3. Remove thermostat housing bolts and housing.
4. Remove thermostat.

   Note: Be sure to note the position of the thermostat.

5. Inspect thermostat for excessive rust, being bent, or struck open. Thermostat should be fully closed when it is removed.
6. Place a container of water on a heat source.
7. Note the thermostat temperature rating and suspend thermostat in water.
8. Insert thermometer in container.
9. Results.

   a. Thermostat should begin to open at a temperature very close to its rated temperature.
   b. Thermostat should be mostly open when temperature reaches about 20 degrees F. above temperature rating of thermostat.

10. Remove container from heat source and turn off heat source.
11. Remove all traces of old gasket material with gasket scrapper.
12. Clean thermostat seat and housing.
13. Place thermostat in position.

    Note: The pellet must always face toward the engine block.

14. Install new gasket. Place gasket sealer on both sides of gasket.
15. Put thermostat housing into position.
16. Start retaining bolts and tighten EVENLY.

    CAUTION: Failure to evenly tighten these bolts may break the housing.

17. Torque bolts to specification.

    Note: Look up torque specifications in shop manual
    or refer to a torque chart.

18. Fill cooling system.
19. Start engine and check for leaks.
20. Recheck coolant level after engine has reached operating temperatures.

LESSON PLAN # 7

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 — Cooling System
(Unit Title)

INFORMATION TOPIC # ______ or DEMONSTRATION # 7

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

Remove, Test & Install Thermostat

1. Why might the thermostat need to be replaced?
2. What procedure should be followed when removing a thermostat?
3. How is a thermostat tested?
4. How must the pellet of the thermostat be positioned in the engine?
5. What precautions must be taken when tightening the water outlet bolts?
6. Why should the coolant level always be rechecked after the engine warms up?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Remove, test and install a thermostat.

2. Review interaction items.

LESSON PLAN # 7

COURSE TITLE/NO. Auto Mechanics

UNIT # 5 **—** Cooling System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Remove, Test & Install Thermostat

Student's Name ____________________

			Yes	No
1.	Drain radiator.	1.	____	____
2.	Remove upper radiator hose if necessary.	2.	____	____
3.	Remove thermostat housing bolts & housing.	3.	____	____
4.	Remove thermostat.	4.	____	____
5.	Inspect thermostat for excessive rust, being bent, or struck open. Thermostat should be fully closed when it is removed.	5.	____	____
6.	Place a container of water on a heat source.	6.	____	____
7.	Note the thermostat temperature rating and suspend thermostat in water.	7.	____	____
8.	Insert thermometer in container.	8.	____	____
9.	Results.	9.	____	____
10.	Remove container from heat source and turn off heat source.	10.	____	____
11.	Remove all traces of old gasket material with gasket scrapper.	11.	____	____
12.	Clean thermostat seat and housing.	12.	____	____
13.	Place thermostat in position.	13.	____	____
14.	Install new gasket. Place gasket sealer on both sides of gasket.	14.	____	____
15.	Put thermostat housing into position.	15.	____	____
16.	Start retaining bolts & tighten EVENLY.	16.	____	____
17.	Torque bolts to specification.	17.	____	____
18.	Fill cooling system.	18.	____	____
19.	Start engine & check for leaks.	19.	____	____
20.	Recheck coolant level after engine has reached operating temperatures.	20.	____	____

Instructor's Name ____________________

Date ____________________

JOB DESCRIPTIONS

CLERICAL

TITLE	DOT NUMBER	JOB DESCRIPTION
Bookkeeper	210.382-014	Keeps complete set of records of financial transactions of establishment. Verifies and enters details of transactions as they occur or in chronological order in account and cash journals from items, such as sales slips, invoices, check stubs, inventory records, and requisitions. Summarizes details on separate ledgers, using adding or calculating machine, and transfers data to general ledger. Balances books and compiles reports to show statistics, such as cash receipts and expenditures, accounts payable and receivable, profit and loss, and other items pertinent to operation of business. Calculates employee wages from plant records or timecards and prepares checks or withdraws cash from bank for payment of wages. May prepare withholding, Social Security, and other tax reports. May compute, type, and mail monthly statements to customers. May complete books to or through trial balance.
Clerk-Typist	203.362-010	Compiles data and operates typewriter in performance of routine clerical duties to maintain business records and reports. Types reports, business correspondence, application forms, shipping tickets, and other matter. Files records and reports, posts information to records, sorts and distributes mail, answers telephone, and performs similar duties. May compute amounts, using adding or calculating machine. May type on or from specialized forms. May compile reports and type prescription data on labels in hospital pharmacy.
File Clerk	206.362-010	Files correspondence, cards, invoices, receipts, and other records in alphabetical or numerical order, or according to subject matter, phonetic spelling, or other system. Reads incoming material and sorts according to file system. Places material in file cabinet, drawers, boxes, or in special filing cases. Locates and removes material from files when requested. Keeps records of material removed, stamps material received, traces missing file folders, and types indexing information on folders. May enter data on records.

Secretary	201.362-030	Schedules appointments, gives information to callers, takes dictation, and otherwise relieves officials of clerical work and minor administrative and business detail. Reads and routes incoming mail. Locates and attaches appropriate file to correspondence to be answered by employer. Takes dictation in shorthand and transcribes notes on typewriter, or transcribes from voice recordings. Composes and types routine correspondence. Files correspondence and other records. Answers telephone and gives information to callers or routes call to appropriate official and places outgoing calls. Schedules appointments for employer. Greets visitors, ascertains nature of business, and conducts visitors to employer or appropriate person. May not take dictation. May arrange travel schedule and reservations. May compile and type statistical reports. May oversee clerical workers. May record minutes of staff meetings. May make copies of correspondence or other printed matter, using copying or duplicating machine. May prepare outgoing mail, using postage-metering machine.
Stenographer	202.362-014	Takes dictation in shorthand of correspondence, reports, and other matter, and operates typewriter to transcribe dictated material. Performs variety of clerical duties except when working in stenographic pool. May transcribe material from sound recording. May work for public stenographic service.
Typist	203.582-066	Types letters, reports, stencils, forms, addresses, or other straight-copy material from rough draft or corrected copy. May verify totals on report forms, requisitions, or bills. May operate duplicating machines to reproduce copy.
Word Processor		Type 40-50 words per minute accurately. Know and understand all comments on a CRT system. Write, modify, and file a document. Type a business letter, envelope, financial report, memo, and telegram. Type reports or letters on continuous forms. Type report in manuscript form. Type checks, vouchers, and purchase orders. Use a standard form and fill in necessary information requested by using CRT system. Demonstrate an above average knowledge of spelling, punctuation, grammar, proofreading, and learning new concepts quickly.

Duplicating-Machine Operator	207.682-010	Operates machine to reproduce data or ruled forms on paper from type in flat impression bed or plates on revolving cylinder. Selects type or embossed plate and positions type or plate on cylinder or flat bed of machine. Loads paper in feed tray and makes adjustments to parts, such as inking rolls or ribbon and feeding mechanism. Starts machine which automatically pushes sheets under revolving cylinder or against flat impression bed or type where paper is printed. May keep record of number of copies made. Important variations may be indicated by trade name of machines used. Cleans and stores stencils for reuse. Files master copies for reuse.
Transcribing-Machine Operator	203.582-058	Operates typewriter to transcribe letters, reports, or other recorded data heard through earphones of transcribing (voice reproducing) machine. Positions record or tape on machine spindle and sets needle on record, or threads tape through machine. Depresses pedal to rotate record or tape. Turns dials to control volume, tone, and speed of voice reproduction. Types message heard through earphones. Reads chart prepared by dictator to determine length of message and corrections to be made. May type unrecorded information, such as name, address, and date. May receive and route callers. Important variations are kinds (trade names) of transcribing machines used. Uses cassette-transcribing machine. May keep file of cassettes.
Receptionist	237.367-038	Receives callers at establishment, determines nature of business, and directs callers to destination. Obtains caller's name and arranges for appointment with person called upon. Directs caller to destination and records name, time of call, nature of business, and person called upon. May issue visitor's pass when required. May make future appointments and answer inquiries. May perform variety of clerical duties and other duties pertinent to type of establishment. May collect and distribute mail and messages.

Working Conditions

Most workers are in areas that are clean, well-lighted, usually free from high noise level, and warm or cool as needed. Receptionists greet customers and visitors; therefore, they usually work in areas that are carefully designed and furnished to make a good impression. May work evenings or weekends in hospitals and some professional offices. The secretary, stenographer, receptionist, accountant, typist, clerk-typist, transcribing machine operator, and word processor work in situations where they will be sitting for long periods of time. The typist, clerk-typist, secretary and stenographer often must type from material that is difficult to read. The transcribing machine operator must often listen and type from material not easily understood. The bookkeeper's work involves examining detailed numerical information which may be tiring. The duplicating machine operator may work in special areas apart from other company offices due to the noisy duplicating office machines. The stenographer takes dictation, then transcribes own notes at a typewriter and may sit in on staff meetings and take notes as well as supervise other stenographers, typists, and clerical workers. Many clerical jobs -- certainly the file clerk -- may require reaching, bending, and/or stooping, which is tiring. Most jobs require an 8-hour day, 40 hour work week.

Salary Range

In 1978 the bookkeeper averaged a wage of $724 per month; the file clerk, $158 per week; the receptionist $152 per week; the typist, clerk-typist, transcribing machine operator, $175 per week; the secretary, $953 per month; and the stenographer, $800 per month. Wages paid to office workers in the Midwest are considerably lower than on the east or west coast. In early 1979, the Federal Government paid its office workers a slightly higher wage than did the private sector.

TASK ANALYSIS

CLERICAL

1. Set up a bookkeeping system.
2. Make entries in a journal.
3. Post to the ledger.
4. Prepare financial statements -- service business.
5. Close the ledger -- service business.
6. Manage merchandising business records.
7. Manage a checking account.
8. Adjust the ledger.
9. Prepare financial statements -- merchandising business.
10. Close the ledger -- merchandising business.
11. Manage payroll records.
12. Demonstrates personal attribute of dependability.
13. Is well-groomed.
14. Communicates well -- written and spoken.
15. Successfully works with others.
16. Continued professional growth.
17. File business correspondence.
18. Set up a filing system.
19. Prepare mailable letters.
20. Compose basic business letters.
21. Type business reports.
22. Sort and distribute mail.

23. Meet the public.

24. Manage the phone.

25. Prepare travel arrangements and reports.

26. Duplicate material on the spirit duplicator.

27. Duplicate material on mimeograph machines.

28. Add, subtract, multiply and divide on a 10-key adding machine.

29. Add, subtract, multiply and divide on a calculator.

30. Prepare a mailable copy from a transcriber.

31. Prepare a mailable copy using a memory typewriter.

32. File and store material using a memory typewriter.

33. Write a document.

34. Modify a document.

35. File a document.

36. Demonstrate understanding of all commands on the CRT system.

37. Type a business letter and envelope.

38. Type a finance report.

39. Type telegrams.

40. Type letters or reports on a continuous form.

41. Type checks, brochures and purchase orders.

42. Fill in requested information on a standardized form using CRT system.

43. Operate the typewriter.

44. Type inner office memorandums.

45. Type business letters.

46. Address envelopes using the typewriter.

47. Type columnar tables.

48. Type columnar tables with columnar headings.

49. Type columnar tables with horizontal and vertical ruling.

50. Type a report in manuscript form.

51. Type information on basic types of forms.

52. Type a news release.

53. Type a contractual agreement.

54. Type financial statements.

55. Read and write alphabetic characters.

56. Memorize brief forms.

57. Read and write amounts and figures.

58. Phrasing.

59. Recognize prefixes, suffixes, word beginnings and endings.

60. Punctuation and application of grammar rules.

61. Visualize symbols and write outlines.

62. Transcribe shorthand dictation.

63. Transcribe in mailable form.

TASK ANALYSIS

CLERICAL

Accounting I

1. Set up a bookkeeping system.
2. Make entries in a journal.
3. Post to the ledger.
4. Prepare financial statements-- service business.
5. Close the ledger--service business.

Accounting II

1. Manage merchandising business records.
2. Manage a checking account.
3. Adjust the ledger.
4. Prepare financial statements--merchandising business.
5. Close the ledger--merchandising business.
6. Manage payroll records.

Personality Development for Business

1. Demonstrates personal attribute of dependability.
2. Is well-groomed.
3. Communicates well--written and spoken.
4. Successfully works with others.
5. Continued professional growth.

Filing

1. File business correspondence.
2. Set up a filing system.

Clerical Office Procedures

1. Prepare mailable letters.
2. Compose basic business letters.
3. Type business reports.
4. Sort and distribute mail.
5. Meet the public.
6. Manage the phone.
7. Prepare travel arrangements and reports.

Machines

1. Duplicate material on the spirit duplicator.
2. Duplicate material on mimeograph machines.
3. Add, subtract, multiply, and divide on a 10-key adding machine.
4. Add, subtract, multiply, and divide on a calculator.
5. Prepare a mailable copy from a transcriber.
6. Prepare a mailable copy using a memory typewriter.
7. File and store material using a memory typewriter.

Word Processor

Task List Provided by Industrial Advisory Committee

1. Write a document.
2. Modify a document.
3. File a document.
4. Demonstrate understanding of all commands on the CRT system.
5. Type a business letter and envelope.
6. Type finance report.
7. Type telegrams.

8. Type a letter or report on a continuous form.

9. Type checks, brochures, and purchase orders.

10. Fill in requested information on a standardized form using CRT system.

Typewriting

1. Operate the typewriter.
2. Type inner office memorandums.
3. Type business letters.
4. Address envelopes using the typewriter.
5. Type columnar tables.
6. Type columnar tables with columnar headings.
7. Type columnar tables with horizontal and vertical ruling.
8. Type a report in manuscript form.
9. Type information on basic types of forms.
10. Type a news release.
11. Type a contractual agreement.
12. Type financial statements.

Shorthand

1. Read and write alphabetic characters.
2. Memorize brief forms.
3. Read and write amounts and figures.
4. Phrasing.
5. Recognize prefixes, suffixes, word beginnings and endings.
6. Punctuation and application of grammar rules.
7. Visualize symbols and write outlines.
8. Transcribe shorthand dictation.
9. Transcribe in mailable form.

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Accounting I

Manipulative Skill	Informational Topic
Set Up a Bookkeeping System	1. Preparing a Balance Sheet
	2. Recording an Opening Entry
	3. Posting an Opening Entry
	4. Debit and Credit of Business Transactions
	5. Debit and Credit of Business Transactions Affecting Income and Expense Accounts
Make Entries in a Journal	6. Journalizing Business Transactions
Post to the Ledger	7. Posting from the Cash Journal
	8. Proving Accuracy of Posting
Prepare Financial Statements-Service Business	9. Preparing a 6-column Worksheet
	10. Preparing Financial Statements
Close the Ledger-Service Business	11. Closing the Ledger

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Accounting II

Manipulative Skill	Informational Topic
	1. Journalizing Transactions of a Merchandising Business
	2. Posting to the Ledgers of a Merchandising Business
Manage Merchandising Business Records	
	3. The Checking Account and Reconciliation of Bank Statements
Manage a Checking Account	
	4. The 8-column Worksheet with Adjustments
Adjust the Ledger	
	5. Financial Statements for a Merchandising Business
Prepare Financial Statements-Merchandising Business	
	6. Adjusting and Closing Entries for a Business
Close the Ledger-Merchandising Business	
	7. Payroll Records
	8. Payroll Accounts, Taxes, and Reports
Manage Payroll Records	

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Personality Development for Business

Manipulative Skill	Informational Topic
	1. Success is 90% Personality
	2. What Makes You Tick
	3. Change-Yourself and Others
Demonstrate Personal Attribute of Dependability	
	4. Your Health is Showing
	5. What About this Dress Jazz?
	6. That Clean and Shining Look-Good Grooming
Is Well-Groomed	
	7. Aids to Communication
	8. Speaking Before Groups
	9. The Common Comma
	10. Using the Semicolon
	11. Number Expression in Business
	12. Your Voice with a Smile-Using the Telephone
Communicates Well-Written and Spoken	
	13. Personality, Psychology and Selling

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Personality Development for Business (continued)

Manipulative Skill	Informational Topic
	14. Group Psychology and the Office
	15. Psychology of Relationships
Successfully Works with Others	
	16. Growing Professionally on the Job
Continued Professional Growth	

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Filing

Manipulative Skill	Informational Topic
File Business Correspondence	1. Card Filing
	2. Correspondence Filing
	3. Requisition, Charge and Follow-Up Procedure
Set Up a Filing System	4. Equipment and Supplies
	5. Elements of a Filing System
	6. Expansion in a Filing System
	7. Processing of Papers to be Filed

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Clerical Office Procedures

Manipulative Skill	Informational Topic
	1. Letter Placement and Styles
	2. Parts of a Letter
	3. Office Stationery
Prepare Mailable Letters	
	4. Basic Understandings of Composition
	5. Letter Composition
Compose Basic Business Letters	
	6. Preparation of Business Reports
	7. Parts of a Business Report
	8. Financial Statements and Reports
	9. Legal Papers, Minutes and Resolutions
Type Business Reports	
	10. Handling Incoming Mail
	11. Handling Outgoing Mail
	12. Air and Surface Shipping
Sort and Distribute Mail	
	13. The Care of Callers
	14. Oral Communications

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Clerical Office Procedures (continued)

Manipulative Skill	Informational Topic
Meeting the Public	
	15. Receiving Calls
	16. Placing Calls
	17. Special Telephone Equipment
	18. Special Communications Services
Manage the Phone	
	19. Travel Services
	20. The Stinerary and the Expense Report
Prepare Travel Arrangements and Reports	

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Office Machines

Manipulative Skill	Informational Topic
	1. Supplies Used in Spirit Duplication
	2. Typing and Storing a Master
	3. Operating a Spirit Duplicator
Duplicate Material on the Spirit Duplicator	
	4. Supplies Used in Mimeograph Duplication
	5. Typing, Cleaning and Storing Stencils
	6. Operating a Mimeograph Machine
Duplicate Material on a Mimeograph Machine	
	7. Operation of a 10-key Adding Machine
	8. Addition by Touch Method
	9. Subtraction and Correction of Errors
	10. Multiplication by Repeat Method
	11. Division by Use of a Reciprocal
Add, Subtract, Multiply and Divide on a 10-key Adding Machine	
	12. Addition
	13. Subtraction

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Office Machines (continued)

Manipulative Skill	Informational Topic
	13. Multiplication and Chain Multiplication
	14. Constant and Accumulative Multiplication
	15. Division, Constant Division, and Accumulative Division
Add, Subtract, Multiply and Divide on a Calculator	
	16. Parts of the Memory Typewriter
	17. Making Adjustments on the Memory
	18. Operating the Memory
	19. Correcting Errors
	20. Operating Special Code Keys
	21. Changing Ribbon, Correction Tape, and Element
	22. Typing Business Forms, Tables, and Papers
Prepare a Mailable Copy Using a Memory Typewriter	
	23. Storing, Recording, and Erasing
	24. Logging and Filing
File and Store Material Using a Memory Typewriter	

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Office Machines (continued)

Manipulative Skill	Informational Topic
	25. Parts of the Transcriber
	26. Operation of the Foot Pedal
	27. Introduction to the Basics of Transcription
	28. Letter Types; How to Proofread and Correct Errors
	29. Personal Assets and Liabilities in Job Seeking; Using the Phone
	30. Application Letter; Inquiry Letter
	31. Resume; Agenda; Letter of Acceptance; Mailing Labels
	32. Conference, Expense, and Sales Reports, the Itinerary
	33. Bill of Lading and News Releases; Graphs; Advertising a Product
	34. Telegram and Mailgram; an Invoice; the Job Interview
	35. Financial Statements for a Business
	36. Incoming and Outgoing Information; Company Records; an Audit
	37. A Table; a Chart; Proofreader's Marks; a Government Letter
	38. Interoffice and Interdepartmental Information; a Will; Company's Inventory
Type Mailable Copy from the Transcriber	

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Typewriting

Manipulative Skill	Informational Topic
	1. Principle Parts of the Typewriter
	2. The Alphabet and Number Keys
Operate the Typewriter	
	3. Interoffice Memorandum
Type Interoffice Memorandums	
	4. Parts of a Business Letter and Placement Guide
	5. Business Letter Styles
	6. Special Notations
	7. Two-page Letters
Type Business Letters	
	8. Addressing Envelopes Including Envelopes with Notations
Address Envelopes Using the Typewriter	
	9. Elements of a Table and Procedure for Typing a Table
Type Columnar Tables	
	10. Centering Columnar Headings
Type Columnar Tables with Columnar Headings	
	11. Ruled Columns

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Typewriting (continued)

Manipulative Skill	Informational Topic
Type Columnar Tables with Horizontal and Vertical Ruling	
	12. Title Page, Letter of Transmittal, Table of Contents
	13. Body of the Report with Footnotes
	14. Bibliography Format
Type a Report in Manuscript Form	
	15. Printed Forms: Invoices, Telegrams, Billing Forms and Payroll
Type Information on Basic Types of Forms	
	16. Manuscripts for Publication
Type a News Release	
	17. Legal Papers, Minutes, and Resolutions
Type a Contractual Agreement	
	18. Financial Statements
Type Financial Statements	

INSTRUCTIONAL ANALYSIS

Course: Clerical

Unit: Shorthand

Manipulative Skill	Informational Topic
	1. Reading and Writing Alphabetic Characters
	2. Memorizing Brief Forms
	3. Reading and Writing Amounts and Figures
	4. Phrasing
	5. Recognize Prefixes, Suffixes, Word Beginnings and Endings
	6. Punctuation and Application of Grammar Rules
Read and Write Shorthand Symbols	
	7. Visualize Symbols and Write Outlines
Take Dictation by Listening	
	8. Techniques of Taking Dictation
	9. Transcribing Shorthand Dictation
Transcribe in Mailable Form	

LESSON PLAN # 1

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # Accounting I

(UNIT TITLE)

SCOPE OF UNIT: To present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 1 OR DEMONSTRATION # ______

Preparing a Balance Sheet

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given proper classroom conditions with 80% accuracy:

A. Match and identify definitions of accounting vocabulary words used in preparing a balance sheet.

B. Prepare a balance sheet according to listed criteria:
  1. Center balance sheet heading
  2. Prepare the assets section
  3. Prepare the liabilities section
  4. Prepare the capital section
  5. Determine if the balance sheet is in balance and complete its preparation

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Slide-Tape Presentation # 1 - "Preparing a Balance Sheet"

Pen, pencil, ruler, and notebook paper

	(Name)	(Date)	Special Learning Features For:
Written By:	Pursley	1/20/82	Individual or Small Group Instruction
Instructional Delivery System By:	143		

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 1, pages 3-11.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972.

View: Slide-Tape Presentation # 1.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Everyone is faced with the need of earning a living and living on what he earns. A knowledge of accounting can help do both. Accounting begins with writing down in dollars and cents what is received and what is paid out.

LESSON PLAN # 1

COURSE TITLE/NO. Clerical Cluster

UNIT # — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 1 (Technical - General - Guidance)

TITLE: Preparing a Balance Sheet

OUTLINE:

I Introduction

A. The Importance of Accounting

1. Accounting touches the lives of everyone.
2. Accounting helps business workers.
3. Accounting is essential for the best management of the business.
4. Accounting is a continuing means of employment.
5. The balance sheet tells the financial position of the business.

B. Accounting for Business Activities

1. Financial activities.
2. Accounting records.
3. Accounting.
4. Accountant.
5. Accounting clerk.
6. Data.
7. Data processing.
8. Automated data processing.

C. Starting An Accounting System for Business

1. What the business owns.
2. What the business owes.
3. What the business is worth.

II The Balance Sheet

A. Definition of Balance Sheet

B. Heading of a Balance Sheet

1. Line 1 - Who? - Name of business.
2. Line 2 - What? - Name of form.
3. Line 3 - When? - Date of form.

C. Body of a Balance Sheet

1. Assets section.
2. Liabilities section.
3. Capital section.

D. Keep Personal and Business Records Separate

Interaction Items # 1 and 2

E. Assets Equal Equities

1. Why a balance sheet has two sides.

III Preparing a Balance Sheet

A. Steps in Preparing a Balance Sheet

1. Prepare heading.
2. Prepare the assets section.
3. Prepare the liabilities section.
4. Prepare the capital section.
5. Determine if the balance sheet is "in balance" and complete its preparation.

Interaction Item # 3

B. Common Accounting Practices

1. Words written in full or abbreviated.
2. Dollar signs, cent signs, and decimal points.
3. The cents column.
4. The single rule.
5. The double rule.
6. Neatness when ruling.

C. The Accounting Equation

1. ASSETS = LIABILITIES + CAPITAL

Interaction Item # 4

IV Summary and Conclusion

A. Introduction

B. The Balance Sheet

C. Preparing a Balance Sheet

D. From time to time, a proprietor will want to know how well his business is doing. Is it making a profit or suffering a loss? Is it worth more or less this month than last month? To obtain these data, an orderly accounting system must be developed. A new accounting system begins by determining the financial position of the business at the time the new system is started. The beginning balance sheet shows the beginning financial position of the business.

LESSON PLAN # 1

COURSE TITLE/NO. Clerical Cluster

UNIT # ____ — Accounting I
(Unit Title)

INFORMATION TOPIC # 1 or DEMONSTRATION # ____

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are the three sections that make up the balance sheet?
2. What sections show:
   a. What a business owns?
   b. What a business owes?
   c. What a business is worth?
3. What are the five steps involved in preparing the balance sheet?
4. Define the term "equities" and give examples of the two types of equities represented on the balance sheet.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Students do the following from Century 21 Accounting textbook:

1. Define: Vocabulary Words -- page 12.
   Check your work.
2. Answer: Study Questions -- page 12.
   Check your work.
3. Do: All of the Drill Problems -- pages 13-14.
   Check your work.

   All of the Problems -- pages 14-16.
   Check your work.

LESSON PLAN # 1

COURSE TITLE/NO. Clerical Cluster

UNIT # ____ — Accounting I
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

I. DIRECTIONS: Complete each item in Column II by selecting one of the terms given in Column I. Then print the identifying number of that term in the Answers column. The terms in Column I are in alphabetic order.

Column I	Column II	Answers
1. Account	1. What the business is worth.	______
2. Accounting equation	2. A business form that lists what is owned, what is owed, and what a business is worth on a specific date.	______
3. Asset	3. The one to whom an amount is owed.	______
4. Balance sheet	4. An amount that is owed is called.	______
5. Capital	5. The claims against the assets of a business.	______
6. Data	6. The statement that assets equal liabilities plus capital.	______
7. Data processing	7. Detailed items.	______
8. Equities	8. An accounting form that is used to sort and summarize the changes caused by business transactions is. . .	______
9. Liability	9. Anything of value.	______
10. Proprietor	10. An owner of a business.	______
11. Creditor	11. The recording, sorting, classifying, calculating, summarizing, and reporting of facts.	______

II Prepare A Balance Sheet

Directions: Prepare a Balance Sheet using Problem Test No. 1, Section A page 169, Teacher's Reference Guide Century 21 Accounting.

LESSON PLAN # 2

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I

(UNIT TITLE)

SCOPE OF UNIT:

Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 2 OR DEMONSTRATION # ______

Recording An Opening Entry

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Match and demonstrate an understanding of accounting vocabulary words and definitions used in preparing an Opening Entry.
2. Classify accounts as asset, liability or capital.
3. Record the Opening Entry from the balance sheet of a service business showing the following:
   a. Date
   b. Debit part
   c. Credit part
   d. Source information

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Slide-Cassette Presentation # 2 - "Recording An Opening Entry"
Pen
Pencil
Ruler
Notebook paper

	(Name)	(Date)	Special Learning Features For:
Written By:	Pursley	1/25/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 2, pages 17-22.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 23-28.

View: Slide-Tape Presentation # 2.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

A businessman will want to know well his business is doing. Is it making a profit or suffering a loss? Is it worth more or less this month than last month? How much more? How much less? An orderly accounting system must be developed in order to obtain these data. An accounting system begins by determining the financial position of the business at the time the new system is started. The financial position is shown on the beginning balance sheet. This data is then recorded in a book of permanent record as the opening entry.

LESSON PLAN # 2

COURSE TITLE/NO. Clerical Cluster

UNIT # I — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 2 (Technical - General - Guidance)

TITLE: Recording an Opening Entry

OUTLINE:

I The Journal Entry

A. Definition of Terms

1. Journal
2. Entry
3. Opening Entry
4. Book of Original Entry

B. The General Journal

1. General Journal Defined
2. Form of General Journal
   a. Date column
   b. Account title column
   c. Post reference column
   d. Debit column
   e. Credit column

C. The Source Document

1. Source Document Defined
2. Source Document for the Opening Entry
3. Relationship of Balance Sheet Columns and General Journal Columns

Interaction Items # 1 and 2

II Steps in Recording the Opening Entry

A. Step 1 - Date of the Entry

B. Step 2 - Debit Part of the Entry

C. Step 3 - Credit Part of the Entry

D. Step 4 - Reason for Our Source of Entry

Interaction Item # 3

III Checking Accuracy

A. Every Journal Entry Must Be "In Balance"

B. Sum of the Debits Must Equal the Sum of the Credits

C. Making Corrections

Interaction Item # 4

IV Summary and Closure

A. The Journal Entry

B. Steps in Recording the Opening Entry

C. Checking Accuracy

D. The opening entry in a journal is a complete record of the assets, the liabilities, and the capital at the time the accounting system is installed.

LESSON PLAN # 2

COURSE TITLE/NO. Clerical Cluster

UNIT # I — Accounting I
(Unit Title)

INFORMATION TOPIC # 2 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is the name of the first book in which the records of a business are recorded?
2. What is the source of that recording?
3. What are the four steps involved in recording the opening entry?
4. What is meant by the statement "The journal entry is 'In Balance'?"

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Students do the following from Century 21 Accounting workbook.

1. Define: Vocabulary Words, page 23.
   Check your work
2. Answer: Study Questions, page 23.
   Check your work
3. Do: All of the Drill Problems, pages 24-25.
   Check your work

   All of the Problems, pages 25-28.
   Check your work

LESSON PLAN # 2

COURSE TITLE/NO. Clerical Cluster

UNIT # I — Accounting I
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

PART I

Section A

DIRECTIONS: Complete each item in Column II by selecting one of the terms given in Column I. Then print the identifying number of that term in the Answers column.

Column I	Column II	ANSWERS
1. Book of original entry 2. Journal	1. The business paper from which a journal entry is made	______
3. Opening entry 4. Source document	2. The first book in which the records of a business are written	______

Section B

DIRECTIONS: After each of the questions below place a check mark in one of the Answer columns to indicate your answer.

	Yes	No
1. Are the liabilities of a business also known as the debts of that business?	___	___
2. Is the assets section of any balance sheet also known as owner's equity?	___	___
3. Do the liabilities of a business represent the equities of the creditors of that business?	___	___
4. Does an opening entry include a record of the income and expenses of a business at the time its accounting system is installed?	___	___

PART II

DIRECTIONS: Classify each item listed at the right by printing in the Answers column the identifying capital letter.

A - if the item is an Asset
L - if the item is a Liability
C - if the item is Capital

ANSWERS

1. Furniture & Fixtures ______
2. Owed to Babbit's Dept. Store ______
3. Cash ______
4. Any item owned ______
5. Any item owed ______
6. The amount that remains after the total liabilities are subtracted from the total assets ______
7. Office Equipment ______
8. Amount owed to Aspen Office Supplies ______

PART III

RECORDING AN OPENING ENTRY

DIRECTIONS: Record an Opening Entry using the Problem Test No. 1 Section B page 169-170 of the Teacher's Reference Guide Century 21 Accounting

LESSON PLAN # 3

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # Accounting I
(UNIT TITLE)

SCOPE OF UNIT: Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 3 OR DEMONSTRATION # ____

Posting the Opening Entry
LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Match the appropriate accounting vocabulary words and definitions used in posting to the ledger.
2. Post the opening entry from the general journal to the accounts in the ledger.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Slide-Tape Presentation # 3-"Posting the Opening Entry"
Century 21 Accounting Textbook and Workbook
Pen, pencil, ruler, and notebook paper

	(Name)	(Date)	Special Learning Features For:
Written By:	Pursley	1/29/82	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 3, pages 29-44.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 39-44.

View: Slide-Tape Presentation # 3

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The life and the success of a business depend upon a never-ending flow of favorable business transactions - the buying and the selling of goods and services, the receipt and the payment of cash. These transactions cause changes to occur in the amounts of assets, liabilities, and capital of a business. It is not practical, however, to prepare a new balance sheet after each transaction nor even after each day's transactions. Instead, accounting records are kept to show the changes in assets, liabilities, and capital caused by business transactions over a period of time. These transactions are recorded in the book of original entry - the journal. Then transferred to the ledger - a group of accounts keeping track of the value of the assets, liabilities and capital.

LESSON PLAN # 3

COURSE TITLE/NO. Clerical Cluster

UNIT # — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 3 **(Technical - General - Guidance)**

TITLE: Posting the Opening Entry

OUTLINE:

I The Ledger

A. Definition of terms

1. Account
2. Ledger
3. Book of secondary entry

B. Debit and Credit

Define and explain:

1. Debit side
2. Credit side
3. Debit entry
4. Credit entry

C. Chart of Accounts

Define:

1. Account title
2. Account number
3. Chart of accounts

Explain: The procedure for assigning numbers to ledger accounts.

D. Opening Accounts in the Ledger
1. Define: Opening an account
2. Explain: The two steps involved in opening accounts in the ledger.
    a. Writing the account title
    b. Writing the account number

Interaction Item #1

II Posting the Opening Entry to the Ledger

A. Define: Posting

B. Steps in Posting Debit Items

1. Write the amount.
2. Write the date.
3. Write the word "balance" in the item column.
4. Posting reference in the account.
5. Posting reference in the journal.

C. Steps in Posting Credit Items

1. Write the amount.
2. Write the date.
3. Write the word "balance" in the item column.
4. Posting reference in the account.
5. Posting reference in the journal.

Interaction Item # 2

D. Summary of Starting an Accounting System

1. The beginning balance sheet - source document for the opening entry.

2. The journal - a book of permanent record in which the opening entry is recorded.

3. The ledger - a group of accounts in which the items in the opening entry are posted.

Interaction Item # 3

III Summary and Closure

A. The Ledger

B. Posting the Opening Entry

C. The ledger is a group of accounts used to sort and summarize the changes caused by business transactions. It is not practical to make a new balance sheet daily to show the changes in the asset, liability and capital accounts. Instead, these changes are first recorded in the journal and then posted to the individual accounts in the ledger for a systematic record kept over a period of time.

LESSON PLAN # 3

COURSE TITLE/NO. Clerical Cluster

UNIT #____—____ Accounting I - Posting the Opening Entry
(Unit Title)

INFORMATION TOPIC # 3 or DEMONSTRATION #________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is the procedure for opening an account?
2. What are the steps involved in posting the opening entry?
3. What are the activities involved in starting an accounting system?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Students do the following from Century 21 Accounting workbook:

1. Define: Vocabulary words - page 39.
   Check your answers.
2. Answer: Study questions - page 39.
   Check your work.
3. Do: All of the drill problems - pages 40-41.
   Check your work.

   All of the problems - pages 41-44.
   Check your work.

LESSON PLAN # 3

COURSE TITLE/NO. Clerical Cluster

UNIT #______— Accounting I - Posting the Opening Entry

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

I VOCABULARY TERMS AND DEFINITIONS

DIRECTIONS: Complete each item in Column II by selecting one of the terms in Column I.

I	II	Answers
1. Account	1. Transferring the entries in a journal to the accounts in a ledger	______
2. Account Title	2. Because the information recorded in the ledger is secured from the journal, the ledger is often called a	______
3. Book of Secondary Entry	3. A diagram that shows all the steps involved in a particular activity or procedure is called a	______
4. Business Transaction	4. A group of accounts is called a	______
5. Flow Chart	5. An exchange of property or services	______
6. Ledger	6. An accounting form that is used to sort and summarize the changes caused by business transactions	______
7. Posting		

II POST THE OPENING ENTRY

DIRECTIONS: Post the Opening Entry using Problem Test No. 1 page 170, Teacher's Reference Guide, Century 21 Accounting.

LESSON PLAN # 4

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I

(UNIT TITLE)

SCOPE OF UNIT:

Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 4 **OR DEMONSTRATION #** ______

Debit and Credit of Business Transactions

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom situation with 80% accuracy:

Identify business transactions affecting the asset, liability, and capital accounts into their debit and credit parts.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Notebook paper
Slide-Tape Presentation # 4 - "Debit & Credit of Business Transactions"

	(Name)	(Date)	Special Learning Features For:
Written By:	Pursley	11/30/81	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 4, pages 45-52.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 53-60.

View: Slide-Tape Presentation # 4

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

As previously noted, a successful business sees a never-ending flow of favorable business transactions. These transactions cause changes to occur in the amounts of assets, liabilities, and capital of a business. After the opening entry is posted, all of the balance sheet accounts in the ledger have beginning amounts on one side or the other. In this chapter you will see how these beginning amounts are changed as a result of business transactions.

LESSON PLAN # 4

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 4 (Technical - General - Guidance)

TITLE: Debit and Credit of Business Transactions

OUTLINE:

I Nature of Account Balances

- A. Debit balance
- B. Credit balance
- C. Why a ledger account has two sides.

II Analyzing Business Transactions

- A. What are the names of the accounts affected?
- B. What is the classification of each account affected?
- C. How is the balance of each of the accounts changed?

III Transaction # 1 - The Sale of an Asset for Cash

- A. Analyze using the three questions given in part II.

  Interaction Item # 1

- B. The debit amount equals the credit amount in each transaction.
- C. Summary of increases and decreases in asset accounts.

IV Transaction # 2 - Part Payment of a Liability

- A. Analyze using the three questions given in part II.

  Interaction Item # 2

- B. Summary of increases and decreases of liability accounts.

V Transaction # 3 - Additional Investment of Capital by Proprietor

- A. Analyze using the three questions given in part II.

Interaction Item # 3

B. Summary of increases and decreases in the proprietor's capital account.

VI Summary and Closure

A. Nature of Account Balances

B. Analyzing Business Transactions

C. Sale of Transaction for Cash

D. Part Payment of Liability

E. Additional Investment of Capital by Proprietor

F. The increase side and the decrease side is determined by the placement of that account on the balance sheet. Assets are on the left side of the balance sheet; therefore, their balance side and increase side is on the left side or the debit side. Liabilities and capital are on the right side of the balance sheet; therefore, their balance side and increase side is on the right side. The decrease side of any account is always the opposite to the increase side.

LESSON PLAN # 4

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Debit and Credit of Business Transactions
(Unit Title)

INFORMATION TOPIC # 4 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Student analyses transaction # 1 - sale of an asset for cash.
2. Student analyses transaction # 2 - part payment of a liability.
3. Student analyses transaction # 3 - additional investment of capital by proprietor.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Each student will perform the following activities:

Define: Vocabulary words on page 53 of text.
Check your answers.

Answer: Study questions on page 53 of text.
Check your work.

Do: All of the drill problems on pages 54-56 of text.
Check your work.

All of the problems on pages 57-60 of text.
Check your work.

LESSON PLAN # 4

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Debit & Credit of Business Transactions

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Section I

Basic Principles of Debit and Credit

Directions: Place a check mark in the Answers column to show which word, debit or credit, completes each statement correctly. The first item, "0", is given as an example.

	Answers		For
	Debit	Credit	Scoring
0. An entry on the left-hand side of any account is recorded as a	✓		0. ✓
1. The balance of any asset account is recorded as a			1.
2. An increase in the balance of any asset account is recorded as a			2.
3. A decrease in the balance of any asset account is recorded as a			3.
4. The balance of any liability account is recorded as a			4.
5. An increase in the balance of any liability account is recorded as a			5.
6. A decrease in the balance of any liability account is recorded as a			6.
7. The balance of the proprietor's capital account is recorded as a			7.
8. An increase in the balance of the proprietor's capital account is recorded as a			8.
9. A decrease in the balance of the proprietor's capital account is recorded as a			9.

Section II

Examining Asset, Liability and Capital Accounts

Directions: For each of the following items, select the phrase that best completes the sentence. Then print in the Answers column at the right the capital letter that identifies your phrase. The first item, "0", is given as an example.

	Answers	For Scoring
0. The debit side of any account is the (A) left-hand side (B) right-hand side (C) balance side (D) decrease side	A	0. ____
1. All increases in any account are always recorded on the (A) debit side (B) right-hand side (C) balance side (D) side opposite the balance side	____	1. ____
2. All decreases in any account are always recorded on the (A) left-hand side (B) credit side (C) balance side (D) side opposite the balance side	____	2. ____
3. The increase side of any asset account is the (A) left-hand side (B) right-hand side (C) credit side (D) side opposite the balance side	____	3. ____
4. The decrease side of any asset account is the (A) debit side (B) credit side (C) left-hand side (D) balance side	____	4. ____
5. The balance side of any asset account is the (A) debit side (B) credit side (C) right-hand side (D) decrease side	____	5. ____
6. The side opposite the balance side of any asset account is the (A) debit side (B) left-hand side (C) right-hand side (D) increase side	____	6. ____
7. The decrease side of any liability account is the (A) balance side (B) side opposite the balance side (C) credit side (D) right-hand side	____	7. ____

	Answers	For Scoring
8. The balance side of any liability account is the (A) debit side (B) credit side (C) left-hand side (D) decrease side	______	8. ______
9. The increase side of any proprietor's capital account is the (A) debit side (B) credit side (C) left-hand side (D) side opposite the balance side	______	9. ______
10. The decrease side of any proprietor's capital account is the (A) left-hand side (B) right-hand side (C) credit side (D) balance side	______	10. ______
11. The side opposite the balance side of any proprietor's capital account is the (A) credit side (B) right-hand side (C) increase side (D) decrease side	______	11. ______

LESSON PLAN # 5

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I

(UNIT TITLE)

SCOPE OF UNIT:

Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data for a service business.

INFORMATION TOPIC # 5 OR DEMONSTRATION #

Debit and Credit of Business Transactions
Affecting Income and Expense Accounts

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Identify basic principles as either debit or credit.
2. Identify business transactions affecting income and expense accounts into their debit and credit parts.
3. Match business vocabulary terms with their definitions.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Notebook paper
Slide-Tape Presentation # 5 - "Debit & Credit of Business Transactions Affecting Income and Expense Accounts"

	(Name)	(Date)	Special Learning Features For:
Written By:	Pursley	12/21/81	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 5, pages 61-67.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 67-74.

View: Slide-Tape Presentation # 5

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Up to this point, business transactions that were debited and credited to asset, liability, and capital accounts were described. In this chapter, transactions that cause increases and decreases in the capital of a business but that are not debited or credited directly to the capital account are explained.

LESSON PLAN # 5

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 5 **(Technical - General - Guidance)**

TITLE: Debit and Credit of Business Transactions
Affecting Income and Expense Accounts

OUTLINE:

I Income Transactions and Income Accounts

- A. Definition of Terms
    1. Income
    2. Profit
    3. Loss
- B. Need for Income Accounts
    1. Cluttered capital account when income is posted directly to one account.
    2. Each kind of income in a separate account.

II An Income Transaction - Received Cash from Room Sales

Interaction Item # 1

- A. Analysis of This Transaction
    1. Name of accounts affected.
    2. Classification of accounts affected.
    3. How has the balance of each account changed?
- B. Summary of Increases and Decreases in Income Accounts

III Expense Transactions and Expense Accounts

- A. Definition of Terms
    1. Expense
- B. Need for Expense Accounts
    1. Cluttered capital account when expense transactions are posted directly to one account.
    2. Each expense is a separate account.

IV An Expense Transaction - Paid Cash for Rent

Interaction Item # 2

A. Analysis of This Transaction

1. Name of accounts affected.
2. Classification of accounts affected.
3. How has the balance of each account changed?

B. Summary of Increases and Decreases in Income Accounts

V Summary and Closure

A. Income Transactions and Income Accounts

B. Received Cash from Room Sales

C. Expense Transactions and Expense Accounts

D. Paid Cash for Rent

E. All income transactions cause an increase in capital. All expense transactions cause a decrease in capital. Instead of crediting the capital account directly for income, however, a separate income account is credited for each different kind of income transaction. Similarly, a separate expense account is debited for each different kind of expense. The use of separate income and expense accounts provides the kind of detailed information needed for the best management of a business.

LESSON PLAN # 5

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Debit & Credit of Business Transactions
(Unit Title) Affecting Income & Expense Accounts

INFORMATION TOPIC # 5 or DEMONSTRATION # ________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. How do you analyze this transaction into its debit and credit parts?

2. How do you analyze this transaction into its debit and credit parts?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Each student will perform the following activities:

Define: Vocabulary words on page 67 of text.
Check your answers.

Answer: Study questions on page 68 of text.
Check your work.

Do: Drills 5-D1, 5-D2, and 5-D3 on pages 69-70 of text.
Check your work.

All of the problems on pages 70-74 of text.
Check your work.

LESSON PLAN # 5

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 **—** Accounting I - Debit & Credit of Business Transactions Affecting Income & Expense Accounts
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Section I

Basic Principles of Debit and Credit

Directions: Place a check mark in the Answers column to show which word, debit or credit, completes each statement correctly.

	Answers		For
	Debit	Credit	Scoring
1. The balance of any income account is recorded as a	______	______	1. ______
2. An increase in the balance of any income account is recorded as a	______	______	2. ______
3. A decrease in the balance of any income account is recorded as a	______	______	3. ______
4. The balance of any expense account is recorded as a	______	______	4. ______
5. An increase in the balance of any expense account is recorded as a	______	______	5. ______
6. A decrease in the balance of any expense account is recorded as a	______	______	6. ______

Section II

Examining Asset, Liability, Capital, Income, and Expense Accounts

Directions: For each of the following items, select the phrase that best completes the sentence. Then print in the Answers column at the right the capital letter that identifies your phrase.

	Answers	For Scoring
1. The decrease side of any income account is the (A) credit side (B) right-hand side (C) balance side (D) side opposite the balance side	______	1. ______
2. The balance side of any income account is the (A) debit side (B) credit side (C) left-hand side (D) decrease side	______	2. ______
3. The increase side of any expense account is the (A) debit side (B) credit side (C) right-hand side (D) side opposite the balance side	______	3. ______
4. The side opposite the balance side of any expense account is the (A) debit side (B) credit side (C) left-hand side (D) increase side	______	4. ______

Section III

Business Vocabulary

Directions: Complete each item in Column II by selecting one of the terms given in Column I. Then print the identifying number of that term in the Answers column. The terms in Column I are in alphabetic order.

Column I	Column II	Answers	For Scoring
1. Expense	1. When the total costs exceed the total income, the diference is called a	______	1. ______
2. Income	2. A decrease in capital that results from the operation of a business is called an	______	2. ______

3. Profit	3. Because income and expense accounts are used to store detailed information until it is summarized and transferred to the capital account, they are known as	______	3. ______
4. Loss	4. When the total income exceeds the total costs of operating a business, the difference is called a	______	4. ______
5. Temporary Capital Accounts	5. An increase in capital that results from the operation of the business is called an	______	5. ______

LESSON PLAN # 6

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I
(UNIT TITLE)

SCOPE OF UNIT:
Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 6 OR DEMONSTRATION # ______

Journalizing Business Transactions
LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Match accounting terms related to journalizing business transactions to definitions.
2. Record financial transactions in a cash journal.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Notebook paper
Slide-Tape Presentation # 6 - "Journalizing Business Transactions"

	(Name)	(Date)	Special Learning Features For:
Written By:	Pursley	12/10/81	Individual or Small
			Group Instruction
Instructional Delivery System By:	178		

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 6, pages 75-89.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 90-98.

View: Slide-Tape Presentation # 6

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

A journal provides an orderly record from which postings are made to accounts in the ledger. The business transactions are recorded directly in a journal and not recorded directly in ledger accounts because journalizing increases accuracy and provides a record of transactions in their chronological order.

LESSON PLAN # 6

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 6 (Technical - General - Guidance)

TITLE: Journalizing Business Transactions

OUTLINE:

I Journalizing

A. Defined

B. Reasons for Journalizing Transactions

1. Journalizing increases accuracy.

2. Journalizing provides a record of transactions in their chronological order.

C. Source Documents for Business Transactions

1. Check stub
2. Receipt
3. Cash register tape

D. Double-Entry Accounting - Complete Accounting

1. Complete accounts
2. Definition of terms
3. Double-entry accounting
4. Single-entry accounting

II Journalizing Cash Transactions

A. General Journal

1. Cash transactions recorded in a two-column general journal.

B. The Cash Journal

1. Cash transactions recorded in a cash journal.

C. Definition of Terms

1. Special journal
2. Cash journal

D. Advantages of Using a Cash Journal

1. Less space is required for recording entries.

2. Less time is required for recording cash transactions.

3. Less time is required for posting.

E. Recording the Cash On Hand in a Cash Journal

1. Memorandum entry
2. Procedures for recording memorandum entry

III Sale of an Asset for Cash - Transaction # 1

A. Analyze into Its Debit and Credit Parts

Interaction Item # 1

B. Four Steps in Journalizing Transaction # 1

1. Date of entry
2. Debit part of entry
3. Credit part of entry
4. Indication of source document

IV Cash Payment of a Liability - Transaction # 2

A. Analyze into Its Debit and Credit Parts

Interaction Item # 2

B. Four Steps in Journalizing Transaction # 2

1. Date of entry
2. Debit part of entry
3. Credit part of entry
4. Indication of source document

V Additional Investment of Capital by Proprietor - Transaction # 3

A. Analyze into Its Debit and Credit Parts

Interaction Item # 3

B. Four Steps in Journalizing Transaction # 3

1. Date of entry
2. Debit part of entry
3. Credit part of entry
4. Indication of source document

VI Cash Income Transaction - Transaction # 4

A. Analyze into Its Debit and Credit Parts

Interaction Item # 4

B. Four Steps in Journalizing Transaction # 4

1. Date of entry
2. Debit part of entry
3. Credit part of entry
4. Indication of source document

VII Cash Payment of an Expense - Transaction # 5

A. Analyze into Its Debit and Credit Parts

Interaction Item # 5

B. Four Steps in Journalizing Transaction # 5

1. Date of entry
2. Debit part of entry
3. Credit part of entry
4. Indication of source document

VIII Proving Accuracy of the Cash Journal Entries

A. Footing the Cash Journal

1. Define footings

B. Proving the Equality of Debits and Credits in the Cash Journal

1. The sum of all debit column totals should equal the sum of the totals of all credit columns.

C. Proving Cash On Hand

1. Proving cash defined
2. Calculations made to prove cash.

IX Ruling the Cash Journal

A. Cash Journal With Double Rules

B. Cash Journal With Totals at the Bottom

X Summary and Conclusion

A. Journalizing

B. Journalizing Cash Transactions

C. Sale of an Asset for Cash

D. Cash Payment of a Liability

E. Additional Investment of Capital by Proprietor

F. Cash Income Transaction

G. Cash Payment of an Expense

H. Proving Accuracy of the Cash Journal Entries

I. Proving Cash on Hand

J. Ruling the Cash Journal

K. The cash journal is a special journal used to record all cash transactions. Special journals aid the accountant because they require: less space for recording journal entries, less time for recording cash transactions, and less time for posting. Each business can plan special columns in the cash journal to fit its needs.

LESSON PLAN # 6

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Journalizing Business Transactions
(Unit Title)

INFORMATION TOPIC # 6 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. How do you analyze a cash sale of an asset into its debit and credit parts?
2. How do you analyze a cash payment of a liability into its debit and credit parts?
3. How do you analyze a cash investment by proprietor into its debit and credit parts?
4. How do you analyze a cash income transaction into its debit and credit parts?
5. How do you analyze a cash payment of an expense into its debit and credit parts?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

The student will perform the following activities:

Define: Vocabulary words on page 90 of the text.
Check your work.

Answer: Study questions on page 90 of the text.
Check your work.

Do: All the drill problems on pages 91-92 of the text.
Check your work.

All the problems on pages 93-98 of the text.
Check your work.

LESSON PLAN # 6

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Journalizing Business Transactions
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Section I

Business Vocabulary

Directions: Complete each item in Column II by selecting one of the terms given in Column I. Then print the identifying number of that term in the Answers column. The terms in Column I are in alphabetic order.

Column I	Column II	Answers	For Scoring
1. Check	1. Recording only the debit part or only the credit part of a transaction is called	______	1. ____
2. Double-Entry Accounting	2. An order in writing, signed by the depositor, ordering the bank to pay cash from the depositor's account is known as a	______	2. ____
3. Journalizing	3. An entry to record information that is not to be posted is called a	______	3. ____
4. Memorandum Entry	4. A journal that is used to record only one type of entry is called a	______	4. ____
5. Single-Entry Accounting	5. Analyzing a business transaction into its debit and credit parts and recording each part in a journal is called	______	5. ____
6. Special Journal	6. The recording of the debit part and the credit part of each transaction is called	______	6. ____

Section II A

Recording Transactions in the Cash Journal

Directions: In the illustration of the cash journal, each column is identified by a capital letter. For each of the transactions listed below, print in the Answers Debit column the capital letter that identifies the column in which the amount of the debit would be recorded. Also, print in the Answers Credit column the capital letter that identifies the column in which the amount of the credit would be recorded.

Cash Journal

Cash Debit	General Debit	Date		Account Title	No.	Post. Ref.	General Credit	Room Sales Credit	Cash Credit
A	B	C	D	E	F	G	H	I	J

	Business Transactions	Answers Debit	Answers Credit	For Scoring Debit	For Scoring Credit
0-0.	Paid cash for electric bill.	B	J	0.	0.
1-2.	Paid cash for newspaper advertising.			1.	2.
3-4.	Received cash from the sale of a bedroom set used in one of the motel units.			3.	4.
5-6.	Received cash from Bruce Lockling, the proprietor, as an additional investment.			5.	6.
7-8.	Paid cash to have motel carpets cleaned.			7.	8.
9-10.	Received cash from room sales.			9.	10.
11-12.	Paid cash for supplies needed in the operation of the motel.			11.	12.
13-14.	Paid cash to the DeMiguel Plumbing Company in part payment of amount owed.			13.	14.
15-16.	Paid cash for a new electric typewriter to be used in the business.			15.	16.
17-18.	Received cash from the sale of an adding machine used in the business.			17.	18.
19-20.	Paid cash to the Kell Furniture Company in full payment of amount owed.			19.	20.

JOURNALIZE CASH TRANSACTIONS

DIRECTIONS: Journalize Cash Transactions using Problem Test No. 1, page 171, Section C, Teacher's Reference Guide, Century 21 Accounting.

LESSON PLAN # 7

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I

(UNIT TITLE)

SCOPE OF UNIT: Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 7 OR DEMONSTRATION #

Posting from the Cash Journal

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Post from the cash journal to ledger accounts with 85% accuracy given proper classroom conditions:

1. The general credit column
2. The general debit column
3. The cash debit column
4. The cash credit column
5. The commissions income credit column

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Slide-Tape Presentation # 7 - "Posting from the Cash Journal"

	(Name)	(Date)	Special Learning Features For:
Written By:	Johnson	1/12/82	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 7, pages 99-112.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: Southwestern Publsihing Co., 1972. Pages 47-58.

View: Slide-Tape Presentation # 7

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In order to know what has happened to the balance of each account in the ledger, it is necessary to post from the cash journal to the ledger by a sorting process called posting. Posting transfers amounts in journals to appropriate accounts in the ledger. The debits and credits in each account can then be added and new balances can be determined easily and quickly.

LESSON PLAN # 7

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 7 (Technical - General - Guidance)

TITLE: Posting from the Cash Journal

OUTLINE:

I Posting from the Cash Journal to the Ledger

A. Importance

B. Need

II Posting General Columns of the Cash Journal

A. Steps in Posting from the General Credit Column

1. Amount of column
2. Date of entry
3. Post reference in ledger
4. Post reference in journal

Interaction Item # 1

B. Steps in Posting from the General Debit Column

1. Amount of debit
2. Date of entry
3. Post reference in ledger
4. Post reference in journal

Interaction Item # 2

III Posting the Special Columns of the Cash Journal

A. Steps in Posting the Total of the Cash Debit Column

1. Amount of debit
2. Date of entry
3. Post reference in ledger
4. Post reference in journal

B. Steps in Posting the Total of the Cash Credit Column

1. Amount of credit
2. Date of entry
3. Post reference in ledger
4. Post reference in journal

C. Steps in Posting the Total of the Commissions Income Credit Column

1. Amount of credit
2. Date of entry
3. Post reference in ledger
4. Post reference in journal

IV Checking Accuracy

A. Cash Journal After Posting is Completed

B. Ledger After Posting is Completed

V Summary and Closure

A. Need and Importance for Posting the Cash Journal to the Ledger

B. Posting the General Columns of the Cash Journal

C. Posting the Special Columns of the Cash Journal

D. Checking Accuracy

E. Posting sorts the amounts recorded in business transactions into debits and credits and then separates them into individual accounts so that the balances of accounts can be easily determined. Data on a source document is recorded in a journal and then is posted to accounts in a ledger.

LESSON PLAN # 7

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Posting from the Cash Journal
(Unit Title)

INFORMATION TOPIC # 7 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are the reasons for cross-referencing in posting?

2. How often is posting done?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Following instructions in textbook and Study Guide 7 in the workbook, students do the following:

1. Drill 7-D1, page 114 of text.
2. Drill 7-D2, page 114 of text.
3. Drill 7-D3, page 115 of text.
4. Problems 7-1, page 115 of text and workbook.
5. Problems 7-B, pages 117-118 of text and workbook.

LESSON PLAN # 7

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Posting from the Cash Journal
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

DIRECTIONS: Post the Eash Journal using problem 7-1, page 50, module 1, The Accounting Cycle, Century 21 Accounting,

* Turn to the cash journal you completed for problem 6-2

* Post each amount recorded in the General Debit and the General Credit Columns.

* Place a check mark in the Post Reference Column for each entry crediting Commissions Income.

* Post the totals of the three special columns of the Cash Journal to Accounts in your ledger. Place a check mark under the General Debit and General Credit Columns to indicate that these totals are not to be posted.

LESSON PLAN # 8

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I

(UNIT TITLE)

SCOPE OF UNIT:

Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 8 OR DEMONSTRATION # ______

Proving Accuracy of Posting

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Locate trial balance terms on trial balance form.
2. Enter account balances in the trial balance columns.
3. Define trial balance terms.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Slide-Tape Presentation # 8 - "Proving Accuracy of Posting"

	(Name)	(Date)	Special Learning Features For:
Written By:	Johnson	1/12/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 8, pages 119-129.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 59-77.

View: Slide-Tape Presentation # 8

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Accounting records must be accurate. Important decisions about business operations should not be made from records in which there are errors. The accounting clerk must be very careful to avoid making errors and know how to check the work for accuracy to see if errors have been made; then, he/she must know how to correct errors as soon as they are found.

LESSON PLAN # 8

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 8 (Technical - General - Guidance)

TITLE: Proving Accuracy of Posting

OUTLINE:

I Proving the Accuracy of the Cash Account

  A. Steps in Figuring and Recording the Balance of the Cash Account

    1. Foot the columns in the cash journal.
    2. Figure the account balance--the difference between the debit and credit columns.
    3. Record the account balance.

  B. Compare the Amount of Cash on Hand With the Balance of the Cash Amount

II Proving the Accuracy of the Ledger

  A. Proving the Equality of the Debits and Credits in the Ledger Through the Trial Balance

  B. Footing the Accounts and Finding Their Balances

  C. Steps in Preparing A Trial Balance

    1. Write trial balance heading at top of sheet that has two amount columns.
    2. Enter on the trial balance each account in the ledger and its balance.
       a. If the account balance is a debit, enter it in the debit column.
       b. If the account balance is a credit, enter it in the credit column.
    3. Rule a single line across both amount columns under the last amount listed.
    4. Add each amount column--totals must equal.
    5. Rule a double line under the totals across the amount columns.

Interaction Item # 1

Interaction Item # 2

III Finding and Correcting Errors

A. Locate Errors Not Disclosed by Trial Balance

B. Identify Common Errors That Cause a Trial Balance Not to Balance

C. Preferred Ways Of Correcting Errors

1. Correct errors in the trial balance.
2. Correct errors in the ledger.

IV Summary and Conclusion

A. Proving the Accuracy of the Cash Account

B. Proving the Accuracy of the Ledger

C. Finding and Correcting Errors

D. Cash, more than any other asset, is subject to loss, theft, or misuse; therefore, control over cash is very important. One means of control over cash it to prove frequently that the amount of cash on hand agrees with the balance of the cash account. Double entry accounting requires that the debit amount must equal the credit amount of each business transaction. The proof of the equality of debits and credits in the ledger is called a trial balance. When the two totals (debits and credits) are equal, it proves the ledger is in balance.

LESSON PLAN # 8

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Proving Accuracy of Posting
(Unit Title)

INFORMATION TOPIC # 8 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What does the word trial mean to you?

2. Is the trial balance a test to determine if the sum of the debits in the ledger equals the sum of the credits in the ledger?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Following instructions in the textbook and workbook, students do the following:

1. Complete Study Guide 8 on pages 59-60 of the workbook.
2. Complete Drills 8-D1 on page 130 of text and page 61 in workbook.
3. Complete Drills 8-D2 on page 131 in text and page 61 in workbook.
4. Problem 8-1 on page 132 in text.
5. Problem 8-2 on page 132 in text and pages 65-68 in workbook.

LESSON PLAN # 8

COURSE TITLE/NO. Clerical Cluster

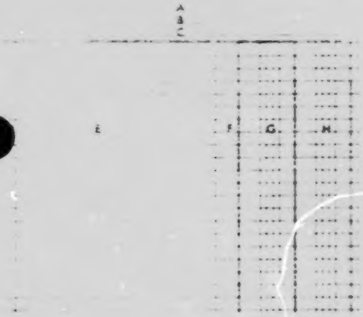
UNIT # 1 **—** Accounting I - Proving Accuracy of Posting
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

SECTION I

LOCATING DATA ON A TRIAL BALANCE

DIRECTIONS: Locate where each of the following items is written on the trial balance by printing the identifying capital letter in the Answers column.



	Answers	For Scoring
0. Words *Trial Balance*	*B*	0. ✓
1. Account title		1.
2. Credit amount		2.
3. Balance of an asset account		3.
4. Day on which trial balance is prepared		4.
5. Ledger account number		5.
6. Balance of an income account		6.
7. Name of the business		7.

	Answers	For Scorin
8. Balance of a liability account		8.
9. Year in which trial balance is prepared		9.
10. Debit amount		10.
11. Balance of the capital account		11.
12. Month in which trial balance is prepared		12.
13. Name of the statement		13.
14. Balance of an expense account		14.

SECTION II

ENTERING ACCOUNT BALANCES IN THE TRIAL BALANCE COLUMNS

DIRECTIONS: After each account title, place a check mark in the proper Trial Balance column to indicate where the account balance should be written.

	Trial Balance		For Scoring
	Debit	Credit	
0. Cash	✓		0. ✓
15. Automobile			15.
16. Office Furniture			16.
17. Office Machines			17.
18. Viotti Furniture Co. (Creditor)			18.
19. McCoy Motors, Inc. (Creditor)			19.
20. D. Lumm, Capital			20.
21. Commissions Income			21.
22. Advertising Expense			22.
23. Automobile Expense			23.
24. Entertainment Expense			24.
25. Miscellaneous Expense			25.
26. Rent Expense			26.

Section III

Directions: For each of the following items, select the phrase that best completes the sentence. Then print in the Answers column at the right the identifying capital letter.

Answers

1. The second step in preparing a trial balance is to (A) enter on the trial balance each account title listed in the ledger and its balance (B) write the trial balance heading at the top of a sheet of paper that has two amount columns (C) rule a single line across both amount columns under the last amount listed 1. ____

2. The proof of the equality of the debits and the credits in the ledger is (A) income statement (B) balance sheet (C) trial balance 2. ____

LESSON PLAN # 9

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I

(UNIT TITLE)

SCOPE OF UNIT:

Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 9 OR DEMONSTRATION # ______

Preparing A 6-Column Worksheet

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Distinguish between debit & credit account balances on a worksheet.
2. Prepare a 6-Column worksheet.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Workbook
Slide-Tape Presentation # 9 - "Preparing A 6-Column Worksheet"

	(Name)	(Date)	Special Learning Features For:
Written By:	Johnson	1/13/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 79-82.

View: Slide-Tape Presentation # 9

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

A six-column worksheet is used as a step towards finding the profit or loss of a business and preparation of up-to-date financial statement. The implications of this worksheet, as you will see, is very crucial to management as they depend upon this report to make major decisions concerning their financial options regarding operation.

LESSON PLAN # 9

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 9 (Technical - General - Guidance)

TITLE: Preparing A 6-Column Worksheet

OUTLINE:

I Introduction of Six-Column Worksheet

A. Analysis Paper and Work Sheet

1. Analysis paper
2. Worksheet

B. Fiscal Period

1. Fiscal period
2. Fiscal year

II The Work Sheet

A. Analyzing the Six-Column Worksheet

1. Three-line heading
2. Account Title column
3. Account Numbers column
4. Six amount columns are in pairs
5. Trial Balance columns
6. Income Statement column
7. Net Income

Interaction Item # 1

8. Net Loss

Interaction Item # 2

Interaction Item # 3

B. Steps in Preparing the Six-Column Worksheet

1. Heading.
2. Column headings.
3. Record trial balance--both columns must be equal.
4. Extend balance sheet items into Balance Sheet columns.

5. Extend the income and expense items into the Income Statement.
6. Total the Income Statement columns and the Balance Sheet columns.
7. Calculate and record the net income (or net loss).
8. Extend the net income into Balance Sheet Credit column.
9. Rule double lines below the final totals of the Income Statement columns and the Balance Sheet columns.

III Summary of Reasons for Preparing a Six-Column Worksheet

A. Major Purposes Worksheet

1. Test quality of debits and credits.
2. Easy means for figuring net income or net loss of business.
3. Summarize and make readily available in one place the updated information for the fiscal period.

B. Income Statement and Balance Statement

1. Used to prepare a financial report showing the net income and net loss for the fiscal period.

IV Trans - Vision Insert - Step-By-Step Review of Preparation of Worksheet

A. Textbook Illustration - Steps A, B, C in Preparing a Worksheet

B. Plastic Overlays - Steps D, E, F, G, H, I in Preparing a Worksheet

V Summary and Closure

A. Introduction to Six-Column Worksheet

B. The Work Sheet

C. Summary of Reason for Preparing a Six-Column Work Sheet

D. Trans - Vision Insert

E. These data are needed for the preparation of two major financial reports of a business--the income statement and the balance sheet. These financial reports are used by management to make decisions on the operation of the business; therefore, it is very important that the data on the worksheet be accurate.

LESSON PLAN # 9

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Preparing a 6-Column Worksheet
(Unit Title)

INFORMATION TOPIC # 9 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. When any business earns more money than it spends on operating expenses, what happens?
2. What happens if the business spends more money on operating expenses than it earns?
3. How does this compare with your personal money handling?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Following instructions in textbook and Study Guide 9 in the workbook, students do the following:

1. Drill 9-D1 on page 143 in text and page 79 in workbook.
2. Drill 9-D2 on page 144 in text and page 79 in workbook.
3. Problem 9-1 on page 144 in text and page 80 in workbook.
4. Problem 9-M on pages 145-146 in text and page 81 in workbook.
5. Problem 9-B on page 146 in text and page 82 in workbook.

LESSON PLAN # 9

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Preparing A 6-Column Worksheet
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

SECTION I SORTING ACCOUNT BALANCES ON THE WORK SHEET

DIRECTIONS: After each account title, place a check mark in the column in which the account balance would be extended on the work sheet.

	Inc. State.		Bal. Sheet		For Scoring
	Debit	Credit	Debit	Credit	
0. Cash			✓		0. ✓
27. Automobile					27.
28. Office Furniture					28.
29. Office Machines					29.
30. Viotti Furniture Co.					30.
31. McCoy Motors, Inc.					31.
32. D. Lumm, Capital					32.
33. Commissions Income					33.
34. Advertising Expense					34.
35. Automobile Expense					35.
36. Entertainment Exp.					36.
37. Miscellaneous Exp.					37.
38. Rent Expense					38.

SECTION II PREPARING A WORKSHEET

Directions: Prepare a worksheet using Problem Test No. 2, page 172, Teacher's Reference Guide Century 21 Accounting.

LESSON PLAN # 10

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I

(UNIT TITLE)

SCOPE OF UNIT:

Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 10 OR DEMONSTRATION # ______

Preparing Financial Statements

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Match business vocabulary words to definitions.
2. Prepare an income statement.
3. Locate data on a balance sheet.
4. Prepare a balance sheet.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Workbook
Slide-Tape Presentation # 10 - "Preparing Financial Statements"

	(Name)	(Date)	Special Learning Features For:
Written By:	Johnson	1/15/82	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 10, pages 147-153.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 83-92.

View: Slide-Tape Presentation # 10

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

A concise statement showing how much a business earned during a certain period is very important to any business owner. The statement that shows what is owned, what is owed, and what a business is worth on a specific date is called a balance sheet. The statement that shows the income, the expenses, and the net worth or the net loss for a fiscal period is called an income statement. It covers a particular period of time. Financial statements are helpful in business management but furthermore, people considering the investment of some of their money in a business could be influenced by a study of its financial statements.

LESSON PLAN # 10

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 10 **(Technical - General - Guidance)**

TITLE: Preparing Financial Statements

OUTLINE:

I Financial Statements

A. Income Statements

1. Income
2. Expenses
3. Net income - net loss
4. Particular period of time
5. Financial progress

Interaction Item # 1

B. Balance Sheet

1. Assets
2. Liabilities
3. Capital
4. Specific date
5. Financial condition

Interaction Item # 2

C. Use of Financial Statements

II Preparing Income Statements

A. Source of Data for the Income Statement

1. Three-part worksheet

a. Heading
b. Account title column
c. Income statement columns

Interaction Item # 1

B. Steps in Preparing the Income Statement

  1. Prepare heading
  2. Prepare income section
  3. Prepare expense section
  4. Figure net income (or net loss)
  5. Rule income statement

III Preparing the Balance Sheet

A. Source of Data for Balance Sheet

B. Steps in Preparing Balance Sheet

  1. Prepare heading
  2. Prepare assets section
  3. Prepare liabilities section
  4. Prepare capital section
  5. Prove and rule balance sheet

Interaction Item # 2

IV Summary and Conclusion

A. Financial Statements

B. Preparing Income Statement

C. Preparing the Balance Sheet

D. Financial statements are helpful in the management of a business by supplying answers to such questions as: What does the business own? What debts are owed? Is income increasing or decreasing? Are expenses too large? Should the business be enlarged? Should selling prices be increased? They also provide helpful information to grantors of credit, such as banks.

LESSON PLAN # 10

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Preparing Financial Statements
(Unit Title)

INFORMATION TOPIC # 10 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What questions does the income statement answer?

2. What questions does the balance sheet answer?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Following instructions in textbook and Study Guide 10 in the workbook, students do the following:

1. Drill 10-D1 on pages 154-155 of the text and page 85 of the workbook.
2. Drill 10-D2 on page 155 of the text and page 85 of the workbook.
3. Problem 10-1 on page 156 of the text and page 86 of the workbook.
4. Problem 10-2 on pages 156-157 of the text and pages 87-90 in the workbook.
5. Problem 10-M on page 157 of the text and page 91 in the workbook.
6. Problem 10-B on page 158 of the text and page 92 in the workbook.

LESSON PLAN # 10

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 **—** Accounting I - Preparing Financial Statements
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Section I

Business Vocabulary

Directions: Complete each item in Column II by selecting one of the terms given in Column I. Then print the identifying capital letter of that term in the Answers column.

	Column I		Column II	Answers	For Scoring
1.	Fiscal Period	1.	The length of time for which an analysis of business operations is made is called a	______	1. ____
2.	Balance Sheet	2.	The report showing the income, the expenses, and the net income or the net loss for a fiscal period is called the	______	2. ____
3.	Open Account	3.	Analysis paper on which the financial condition of a business is conveniently summarized is called a	______	3. ____
4.	Income Statement				

DIRECTIONS: For each of the following items, select the phrase that best completes the sentence. Then print in the Answers column at the right the identifying capital letter.

10. The income statement is a report that shows the **(A)** financial progress of a business for a fiscal period **(B)** financial condition of a business on a particular date **(C)** net worth of a business for a past fiscal period. **10.**

11. The most convenient source for obtaining all of the amounts needed on the income statement is the **(A)** Debit and Credit columns in the general ledger **(B)** Trial Balance columns of the work sheet **(C)** Income Statement columns of the work sheet . . . . **11.**

12. The amounts for preparing the income section of the income statement are obtained from the **(A)** Trial Balance Debit column of the work sheet **(B)** Income Statement Debit column of the work sheet **(C)** Income Statement Credit column of the work sheet . . . . **12.**

13. The amounts for preparing the expenses section of the income statement are obtained from the **(A)** Trial Balance Credit column of the work sheet **(B)** Income Statement Debit column of the work sheet **(C)** Income Statement Credit column of the work sheet . . . . **13.**

14. All calculations on the income statement are assumed to be correct when the net income amount on the income statement agrees with the **(A)** net income amount in the Income Statement Debit column of the work sheet **(B)** total of the Income Statement Debit column of the work sheet **(C)** total of the Income Statement Credit column of the work sheet . . . . **14.**

15. The balance sheet is a report that shows the **(A)** financial progress of a business for a fiscal period **(B)** financial condition of a business on a particular date **(C)** net income of a business for a past fiscal period . . . . **15.**

16. The amounts for the assets section of the balance sheet are obtained from the **(A)** Income Statement Debit column of the work sheet **(B)** Balance Sheet Debit column of the work sheet **(C)** Balance Sheet Credit column of the work sheet . . . . **16.**

17. The amounts for the liabilities section of the balance sheet are obtained from the **(A)** Income Statement Credit column of the work sheet **(B)** Balance Sheet Debit column of the work sheet **(C)** Balance Sheet Credit column of the work sheet . . . . **17.**

Section II

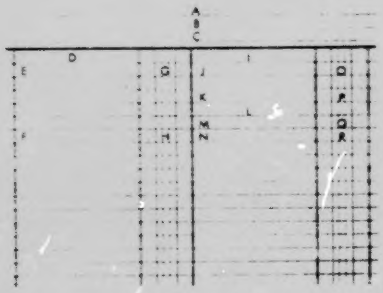
PREPARING AN INCOME STATEMENT

INSTRUCTIONS: Prepare an income statement for the Grand Canyon Travel Agency. Use the form provided.

Section III

LOCATING DATA ON A BALANCE SHEET

DIRECTIONS: Locate where each of the following items is written on the balance sheet by printing the identifying capital letter in the Answers column.



	Answers	For Scoring
0. Name of business	A	0. √
39. Section heading *Capital*		39.
40. Words *Total Assets*		40.
41. Section heading *Liabilities*		41.
42. Title of capital account		42.
43. Total amount of assets		43.
44. Amount of each liability item		44.
45. Specific date of statement		45.
46. Amount of capital		46.
47. Name of statement		47.
48. Total amount of liabilities		48.

	Answers	For Scoring
49. Section heading *Assets*		49.
50. Words *Total Liabilities and Capital*		50.
51. Title of each asset account		51.
52. Words *Total Liabilities*		52.
53. Amount of each asset item		53.
54. Total amount of liabilities and capital		54.
55. Title of each liability account		55.

Section IV

Preparing A Balance Sheet

INSTRUCTIONS: **Prepare a balance sheet for the Grand Canyon Travel Agency. Use the form provided.**

LESSON PLAN # 11

LESSON PLAN FORMAT

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 Accounting I
(UNIT TITLE)

SCOPE OF UNIT:

Present the accounting cycle in its simplest form so that the student can analyze, record in journals, and post in a general ledger the financial data of a service business.

INFORMATION TOPIC # 11 OR DEMONSTRATION # ______

Closing the Ledger

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Match debit & credit entries to determine closing entries.
2. Record and post closing entries.
3. Rule and balance open accounts.
4. Prepare a post-closing trial balance.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pen
Pencil
Ruler
Workbook
Slide-Tape Presentation # 11 - "Closing the Ledger"

	(Name)	(Date)	Special Learning Features For:
Written By:	Johnson	1/17/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Read: Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting. Cincinnati, OH: South-Western Publishing Co., 1972. Chapter 11, pages 159-173.

Boynton, Swanson, Carlson and Forkner. Module 1 The Accounting Cycle Century 21 Accounting Working Papers and Study Guides. Cincinnati, OH: South-Western Publishing Co., 1972. Pages 93-111.

View: Slide-Tape Presentation # 11

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

All income to the business increases capital, while every expense decreases capital. One is a plus while the other is a minus. The income and expense accounts are temporary - we start each of them anew at the beginning of each fiscal period. At the end of each fiscal period, after the income statement is completed, the income and expense accounts have served their purpose. It is then necessary to summarize in one ledger account the detailed information stored in the various income and expense accounts; transfer the net income (or net loss) to the capital account; and rule the ledger accounts to prepare for the next fiscal period.

LESSON PLAN # 11

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I
(Unit or Block Title)

INFORMATION TOPIC # 11 (Technical - General - Guidance)

TITLE: Closing the Ledger

OUTLINE:

I Closing Entries

A. Income and Expense Summary Account

1. Closing entry
2. Closed account
3. Closing the ledger

Interaction Item # 1

B. Steps in Closing the Ledger

1. Closing the income accounts

Interaction Item # 2

2. Closing the expense accounts
3. Closing the income and expense summary account

C. Summary of Closing Entries

1. Entry # 1
2. Entry # 2
3. Entry # 3

II Ruling and Balancing Accounts

A. Ruling Accounts That Are Closed

B. Balancing and Ruling Accounts That Are Open

C. Ledger That Has Been Closed, Balanced and Ruled

III Post-Closing Trial Balance

A. Trial Balance - Test Equality of Debits and Credits in the Ledger

B. No Income or Expense Account is Included on Post-Closing Trial Balance

C. Post-Closing Trial Balance - Means of Checking That Ledger is in Balance and Ready for Use in a New Fiscal Period.

IV Summary and Closure

A. Closing Entries

B. Ruling and Balancing Accounts

C. Post-Closing Trial Balance

D. The process of transferring the balances of the income and the expense accounts through a summary account to the proprietor's capital account is called closing the ledger. Finally, after the closing entries have been posted and the accounts have been balanced and ruled, it is customary to take a trial balance of the ledger. This trial balance is called the post-closing trial balance.

LESSON PLAN # 11

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 — Accounting I - Closing the Ledger
(Unit Title)

INFORMATION TOPIC # 11 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is the Income and Expense Summary Account? Is it a bridge or gap between the temporary accounts and the capital account?
2. If income is larger than expenses, does the business show a net profit? If the expenses are greater than the income, then does the business suffer a net loss?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Following instructions in textbook and Study Guide 11 in the workbook, students do the following:

1. Drill 11-D1 on page 175 of the text and page 95 of the workbook.
2. Drill 11-D2 on page 176 of the text and page 95 of the workbook.
3. Problem 11-1 on page 176 of the text and page 96 of the workbook.
4. Problem 11-2 on page 177 of the text and page 96 of the workbook.
5. Problem 11-3 on page 177 of the text and pages 97-102 of the workbook.

LESSON PLAN # 11

COURSE TITLE/NO. Clerical Cluster

UNIT # 1 **—** Accounting I - Closing the Ledger
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Section I

CLOSING THE LEDGER

DIRECTIONS: For each of the following closing entries, indicate the accounts to be debited and credited by writing the account number in the Debit and the Credit columns. Select the account numbers from the list given below at the left. Only the accounts needed for the closin entries are given in the list.

ACCOUNT TITLES	ACCT. NOS.
James Benson, Capital	31
Income and Expense Summary	32
Commissions Income	41
Room Sales	42
Advertising Expense	51
Automobile Expense	52
Entertainment Expense	53
Miscellaneous Expense	54
Rent Expense	55

	Answers		For Scoring	
	Debit	Credit	Debit	Credit
0-0. Close the room sales account	42	32	0. ✓	0. ✓
18-19. Close the commissions income account			18.	19.
20-21. Close all the expense accounts			20.	21.
22-23. Close the income and expense summary account (net income)			22.	23.
24-25. Close the income and expense summary account (net loss)			24.	25.

Section II

RECORDING AND POSTING CLOSING ENTRIES

INSTRUCTIONS: 1. Record the closing entries for the Grand Canyon Travel Agency. Use the general journal form provided. 2. Post the closing entries to the general ledger accounts that appear in Section A.

GENERAL JOURNAL PAGE 1

	DATE		ACCOUNT TITLE	POST. REF.	DEBIT	CREDIT	
1							1
2							2
3							3
4							4
5							5
6							6
7							7
8							8
9							9
10							10

Section III

Closing the Ledger

Directions: Rule and balance all asset, liability, and capital accounts on the following forms.

LEDGER

ACCOUNT *Cash* ACCOUNT NO. *11*

DATE	ITEM	POST. REF.	DEBIT	DATE	ITEM	POST. REF.	CREDIT
19-- Nov 1	Balance	J1	1069 76	19-- Nov 30		C2	2643 71
30		C2	3181 75				

ACCOUNT *Baker Brothers, Inc* ACCOUNT NO. *21*

DATE	ITEM	POST. REF.	DEBIT	DATE	ITEM	POST. REF.	CREDIT
19-- Nov 12		C1	100 00	19-- Nov 1	Balance	J1	300 00

ACCOUNT *Ernest Cain, Capital* ACCOUNT NO. *31*

DATE	ITEM	POST. REF.	DEBIT	DATE	ITEM	POST. REF.	CREDIT
				19-- Nov 1	Balance	J1	5310 00

Section IV

Post-Closing Trial Balance

Directions: Prepare a post-closing trial balance using the ledger balances on pages 97-99 in the workbook.

JOB DESCRIPTIONS

DIESEL MECHANICS

TITLE	DOT NUMBER	JOB DESCRIPTION
Diesel Mechanic	625.281-010	Repairs and maintains diesel engines used to power machines, such as such as buses, trucks, and construction machinery, using hand tools, precision-measuring instruments, and machine tools. Diagnoses trouble, disassembles engines and examines parts for defects and excessive wear. Reconditions and replaces parts, such as pistons, bearings, gears, valves, and bushings using hand tools and precision-measuring instruments. May weld and cut parts using arc welder and flame cutting equipment.
Automobile Mechanic	620.261-010	Repairs and overhauls automobiles, buses, trucks and other automotive vehicles. Examines vehicle and discusses with customer the nature and extent of damage or malfunction. Plan work procedure using charts, technical manuals, and experience. Raises vehicle using hydraulic jack or hoist to gain access to mechanical unit bolted to underside of vehicle. Removes unit such as engine, transmissions, or differential using wrenches and hoist. Disassembles unit and inspects parts for wear using micrometer, calipers, and thickness gages. Repairs or replaces parts such as pistons, rods, gears, valves, and bearings using mechanic hand tools. Overhauls or replaces carburetors, blowers, generators, distributors, starters, and pumps. Rebuild parts by using welding equipment. Rewires ignition system, lights, and instrument panel. Relines and adjusts brakes, align front end, repairs or replaces shock absorbers, and welds broken parts. Replaces and adjusts headlights and installs and repairs accessories such as radios, heater, mirrors, windshield wipers, air conditioner, cruise control, climate control, or electrical system.

Diesel Mechanic Helper	625.684-010	Assists diesel mechanic in overhauling and maintaining diesel motors used to operate truck, generators, and other equipment. Disassembles motor and cleans parts. Obtains parts from stock and hands tools to mechanic. Assists in reassembly and cleans tools and working area.
Diesel Engine Tester	625.261-010	Analyzes operation of diesel engine and components, such as blowers and compressors, to determine performance using manufacturer's specifications and test equipment. Align, connect oil, fuel, and water lines to engine. Replaces defective parts and adjusts settings on injection pump, timing, fuel rack and governor, using dial indicator, micrometer, feeler gages, and hand tools. May disassemble and repair engines and perform field service work.
Automobile-Radiator Mechanic	620.381-010	Repairs cooling systems and fuel tanks in automobiles, buses, trucks and other automotive vehicles. Flushes radiator with cleaning compound to remove obstructions such as rust or mineral deposits. Remove and replace radiator core, disassembles, repairs, or replaces defective water pump. Replaces faulty thermostats and leaky head gaskets. Installs new cores, hoses, and pumps. Cleans, tests, and repairs or replaces fuel tanks.
Brake Repairer	620.281-026	Repairs and overhauls brake systems in automobiles, buses, trucks and other automotive vehicles. Pushes handle of hydraulic jack or pushes hoist control to raise vehicle axle. Removes wheels using wrenches, wheel puller, and sledge hammer. Replaces defective brake shoe unit or attaches new lining to brake shoes. Measures brake drum to determine amount of wear using feeler gage. Inserts vacuum gage into power brake cylinder, starts engine, and reads gage to detect brake-line leaks. Repairs or replaces leaky brake cylinders. Repairs or replaces defective air compressor in air brake systems. Replaces wheel on axles and adjusts drumshoe clearance using wrench. Fill master brake cylinder with brake fluid, pumps brake pedal or uses pressure tank, and opens valves on hydraulic brake system to bleed air from brake lines. Closes valves and refills master brake cylinder.

Air Conditioning Mechanic	620.281-010	Installs and repairs automotive air-conditioning unit. Bolts compressor to engine block and installs driving pulley on front end of crankshaft. Places belt on pulleys, adjusts tension, and tightens bolts. Bolts evaporator unit under dashboard or in trunk. Welds or bolts mounting brackets to automobile frame. Drills holes through interior panels, threads hoses through holes and connects hoses to compressor, evaporator, and cool-air outlet. Fills compressor with refrigerant and starts unit. Measures compressor pressure to determine efficiency of compressor, using gages. Listens to operating unit for indications of malfunction. Removes faulty unit from vehicles, disassembles them, and replaces worn and broken parts and fluid in unit. Makes electrical connections as required. May specialize in installation of automotive air-conditioning units.
Transmission Mechanic	620.281-062	Repairs manual and automatic transmission in automobiles, buses, trucks, and other automotive vehicles. Raises automotive vehicle using jack or hoists and removes transmission using mechanic hand tools. Disassembles transmission unit and replaces broken or worn parts such as bands, gears, seals and valves. Adjusts pumps, bands, and gears as required using wrenches. Installs repaired transmission and fills it with specified fluid. Adjusts operating linkage and tests operation on road. May adjust carburetor, may verify idle speed of motor using equipment, such as tachometer, making required adjustments.
Front-End Mechanic	620.281-038	Aligns wheels, axles, frames, torsion bars and steering mechanisms of automotive vehicles such as automobiles, buses, and trucks. Drives automotive vehicle onto wheel alignment rack and tests vehicle for faulty wheel alignment, bent axles, worn ball joints, and bent steering rods using alignment testing machine. Straightens axle and steering rods and adjusts shims, tie rods, and joining pins to align wheels, or installs new parts using hand tools. Places wheel on balancing machine to determine where counterweights must be added to balance wheel. Hammers counterweights onto rim of wheel. Installs shock absorbers. Straightens frame, using hydraulic jack, chassis aligner, and acetylene torch.

Working Conditions

Truck and bus mechanics usually work indoors, although they may occasionally work or make repairs on the road. They are subject to the usual shop hazards such as cuts and bruises. Mechanics handle heavy, greasy, dirty parts and may stand or lie in awkward or cramped positions to repair vehicles. Work areas usually are well-lighted, heated, and ventilated and many employers provide locker rooms and shower facilities.

Salary Range

Truck and bus mechanics employed by trucking companies, buslines, and other firms that maintain their own vehicles had estimated average hourly earnings of $9.50 in the 1980's. A beginning apprentice usually earns one-half the rate of a skilled worker and receives increases about every six months until they complete their apprenticeship and reach the rate of skilled mechanics. Most work between 40-48 hours per week. Those shops that provide around the clock service work evenings, nights, and weekends. They usually receive a higher rate of pay for this work. Many shops provide extra benefits such as sick-leave, insurance benefits, and paid vacations.

TASK ANALYSIS

DIESEL MECHANIC

Diagnose, service or repair air conditioning system.

Diagnose, remove, service or repair electrical system.

Diagnose, remove or repair starting system.

Diagnose and repair lighting system.

Diagnose, remove, replace or repair a fuel system.

Diagnose, remove, replace or repair a cooling system.

Service cooling system.

Diagnose and repair air intake system.

Diagnose and repair exhaust system.

Remove, repair, replace or overhaul engine.

Grind valves.

Diagnose and tune-up a diesel engine.

Remove, overhaul or replace a standard transmission.

Remove and replace clutch.

Remove, replace or repair differential.

Diagnose and repair brake system.
Remove and replace springs.

Diagnose and repair suspension system.

Diagnose, repair and service hydraulic system.

TASK ANALYSIS

DIESEL MECHANICS

Air Conditioning

1. Diagnose, service, or repair air conditioning system.

Electrical System

1. Diagnose, remove, service or repair electrical system.
2. Diagnose, remove or repair starting system.
3. Diagnose and repair lighting system.

Fuel System

1. Diagnose, remove, replace or repair fuel system.

Cooling System

1. Diagnose, remove, replace or repair cooling system.
2. Service cooling system.

Air System

1. Diagnose and repair air intake system.

Exhaust System

1. Diagnose and repair exhaust system.

Engine Overhaul

1. Remove, repair, replace or overhaul engine.
2. Grind valves.

Tune-Up Engine

1. Diagnose and tune-up diesel engine.

Transmission

1. Remove, overhaul or replace a standard transmission.

Differential

1. Remove, replace or repair differential.

Clutch

1. Remove and replace clutch.

Brake System

1. Diagnose and repair brake system.
2. Remove and replace brake shoes.

Suspension

1. Remove and replace springs.
2. Diagnose and repair suspensions systems.

Hydraulic System

1. Diagnose, repair and service hydraulic system.

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Air Conditioning

Skilled Activity	Informational Topic
	1. Working Safety with Air Conditioning Units
	2. Special Tools and Equipment
	3. Trouble-Shooting an Air Conditioning Unit for Malfunctions
Trouble-Shoot an Air Conditioning Unit	
	4. Evacuating and Charging an Air Conditioning Unit
Evacuate and Charge an Air Conditioning Unit	
	5. Removing and Replacing Defective Air Conditioning Unit Components
Remove and Repair Defective Components	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Electrical System

Skilled Activity	Informational Topic
	1. Introduction to Troubleshooting the Electrical System
	2. Testing Different Parts of the Electrical System
Troubleshooting the Charging System	
	3. Removing and Replacing Parts on a Charging System
Remove and Repair Charging System	
	4. Servicing the Charging System
Service the Charging System	
	5. Introduction to Troubleshooting the Starting System
	6. Testing Different Parts of the Starting System
Troubleshooting the Starting System	
	7. Removing and Replacing Defective Parts on the Starting System
Remove and Replace Defective Parts of the Starting System	
	8. Repairing Parts of the Starting System
Repair Parts/Components of the Starting System	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Electrical System (continued)

Skilled Activity	Informational Topic
	9. Introduction to Troubleshooting the Lighting System
Troubleshooting the Lighting System	
	10. Testing Parts of the Lighting System
	11. Removing and Replacing Any Defective Parts of the Lighting System
Remove and Repair Any Defective Parts of the Lighting System	
	12. Repairing Parts of the Lighting System
Repair Parts of the Lighting System	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Fuel System

Skilled Activity	Informational Topic
Troubleshoot the Fuel System	1. Introduction to Troubleshooting the Fuel System
Test the Defective Components of the Fuel System	2. Testing Defective Components of the Fuel System
Remove and Replace Defective Components of the Fuel System	3. Removing and Replacing Any Defective Components on the Fuel System
Repair Defective Components of the Fuel System	4. Repairing Defective Components of the Fuel System

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Cooling System

Skilled Activity	Informational Topic
	1. Introduction to Troubleshooting the Cooling System
Troubleshoot the Cooling System	
	2. Testing Defective Parts of the Cooling System
Test Defective Parts of the Cooling System	
	3. Removing and Replacing Defective Parts of the Cooling System
Remove and Replace Defective Parts of the Cooling System	
	4. Repair Defective Parts of the Cooling System
Repair Defective Parts	
	5. Introduction to Servicing the Cooling System (Safety)
	6. Checking and Testing the Cooling System and Making Adjustments to Specifications
Check and Test the Cooling System and Make Adjustments to Specifications	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Air System

Skilled Activity	Informational Topic
	1. Introduction to Troubleshooting the Air System
Troubleshoot the Air System	
	2. Inspecting Defective Parts of the Air System
Inspect Defective Parts of the Air System	
	3. Removing or Replacing Defective Parts of the Air System
Remove or Replace Defective Parts of the Air System	
	4. Repairing and Testing of the Air System
Repair and Test the Air System	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Exhaust System

Skilled Activity	Informational Topic
Troubleshoot the Exhaust System	1. Introduction to Troubleshooting the Exhaust System
Remove and Repair Defective Parts of the Exhaust System	2. Removing and Repairing the Defective Parts of the Exhaust System
Test and Check the Exhaust System to Manufacturer's Specifications	3. Testing and Checking the Exhaust System to Manufacturer's Specifications

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Engine Overhaul

Skilled Activity	Informational Topic
	1. Introduction to Troubleshooting the Engine Overhaul
Troubleshoot Engine Overhaul	
	2. Removing and Replacing the Engine
Remove and Replace the Engine	
	3. Repairing Defective Components on the Engine in the Frame
Repair Defective Components in Frame	
	4. Overhauling or Rebuilding the Engine
Overhaul the Engine	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Valves

Skilled Activity	Informational Topic
Troubleshoot the Valves and Components	1. Introduction to Troubleshooting the Valves and Components
Remove, Inspect, and Test the Defective Components	2. Removing, Inspecting, and Testing the Defective Components
Replace or Repair Defective Components	3. Replacing or Repairing the Defective Components

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Tune-Up Engine

Skilled Activity	Informational Topic
	1. Introduction to Troubleshooting the Tune-Up
Troubleshoot the Tune-Up	
	2. Testing and Adjusting Different Components of the Diesel Engine
Make a Test and Adjustments of Different Components of the Diesel Engine	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Transmission

Skilled Activity	Informational Topic
Troubleshoot a Transmission	1. Introduction to Troubleshooting a Transmission
Remove or Replace a Transmission	2. Removing or Replacing a Transmission
Inspect, Disassemble, and Overhaul a Transmission	3. Inspecting, Disassembling, and Overhauling a Transmission

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Differential

Skilled Activity	Informational Topic
	1. Introduction to Troubleshooting a Differential Assembly
Troubleshoot a Differential Assembly	
	2. Removing and Replacing a Differential
	3. Removing and Inspecting Defective Components
Remove and Inspect Defective Components	
	4. Repairing Defective Components of a Differential
Repair a Differential	

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Clutch

Skilled Activity	Informational Topic
Troubleshoot the Clutch	1. Introduction to Troubleshooting the Clutch
Adjust and Test the Clutch	2. Adjusting and Testing the Clutch
Remove and Replace the Clutch Assembly	3. Removing and Replacing the Clutch Assembly

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Brake System

Skilled Activity	Informational Topic
Troubleshoot the Brake System	1. Introduction to Troubleshooting the Brake System
Remove and/or Replace Defective Parts of the Brake System	2. Removing and/or Replacing Defective Parts of the Brake System
Repair Defective Parts of the Brake System	3. Repairing Defective Parts of the Brake System

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Suspension

Skilled Activity	Informational Topic
Troubleshoot the Spring Assembly	1. Introduction to Troubleshooting the Spring Assembly
Remove and Replace Springs	2. Removing and Replacing Springs
Overhaul Spring Assembly	3. Inspecting and Repairing Defective Springs or Other Parts
Troubleshoot the Suspension System	4. Introduction to Troubleshooting the Suspension System
Repair Suspension System	5. Repairing Suspension System
Remove and Replace Defective Parts of the Suspension System	6. Removing and Replacing Defective Parts of the Suspension System
Overhaul the Components of the Suspension System	7. Overhauling the Defective Components of the Suspension System

INSTRUCTIONAL ANALYSIS

Course: Diesel Mechanics

Unit: Hydraulic System

Skilled Activity	Informational Topic
Troubleshoot the Hydraulic System	1. Introduction to Troubleshooting the Hydraulic System
Test, Remove, or Repair Defective Parts of the Hydraulic System	2. Testing, Removing, or Repairing Defective Parts of the Hydraulic System
Service the Hydraulic System and Its Component Parts	3. Servicing the Hydraulic System and Its Component Parts

LESSON PLAN # 1

LESSON PLAN FORMAT

COURSE TITLE/ÑO. Diesel Mechanics

UNIT # Air Conditioning
(UNIT TITLE)

SCOPE OF UNIT: In working with the air conditioning unit the student will demonstrate a knowledge and understanding of operation safety, special tools, troubleshooting for malfunction, evacuating and charging an air conditioning unit, and replacing defective parts.

INFORMATION TOPIC # 1 OR DEMONSTRATION # ____

Working Safety With Air Conditioning Units

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 100% accuracy:

1. List four safety precautions and their hazard when handling R-12 refrigerant.
2. List nine safety rules and their hazards relating to servicing the air conditioning system.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

	(Name)	(Date)	Special Learning Features For:
Written By:			Individual or Small
Instructional Delivery System By:			Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Johanning, Michael, editor. Air Conditioning-Fundamentals of Service, 3rd edition. Moline, IL: John Deere Fundamental Writing Services, 1979. Chapter 2, pages 9-10.

Stockel, Martin W. Auto Service and Repair. South Holland, IL: Goodheart-Willcox Company, Inc., 1978. Chapter 32, pages 769, 770, and 784.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In today's automotive field you will find that air conditioning has become almost a standard item on all types of vehicles. In servicing the air conditioning system there are a few important rules you must know to prevent injury to yourself and others. In this lesson we will learn the most essential safety rules needed to prevent accidents and serious injuries when servicing the air conditioning unit, and discuss possible hazards related to poor safety procedure.

LESSON PLAN # 1

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

INFORMATION TOPIC # 1 (Technical - General - Guidance)

TITLE: Working Safety With Air Conditioning Units

OUTLINE:

I R-12 Refrigerant

A. Definition: Liquid that runs through the lines of the air conditioning system.

B. Rules

1. Do not get refrigerant on skin; the hazards being frostbite and blindness.

Interaction Item # 1

2. Do not overheat the container; the hazards being pressure build-up explosion.

Interaction Item # 2

3. Do not discharge refrigerant into an enclosed area having an open flame; the hazard being phosgene gas produced can cause toxic condition or suffocation.

Interaction Item # 3

4. Do not handle without suitable eye protection.

a. Precaution

b. Hazards

1. Breakage of hoses.
2. Breakage of line "O" rings.

C. Exposure to R-12: Precautionary Steps if Exposed

1. Don't panic.

2. Splash water into eyes (do not rub eyes).

3. Consult physician.

II Safety and Hazards When Servicing an Air Conditioning Unit

A. Nine Important Rules

1. Always wear goggles when servicing the system.

   (Blindness)

2. Keep service area well-ventilated.

   (Suffocation)

Interaction Item # 4

3. Do not discharge refrigerant directly into the service area where there is an open flame.

   (Phosgene gas)

4. Do not subject a system to high temperatures.

   (Explosion)

5. Keep refrigerant away from your skin.

   (Frostbite)

6. Never leave a refrigerant tank uncapped.

   (Dirt)

7. Never overheat the refrigerant tank or can.

   (Explosion)

8. Never fill a tank completely.

   (Expansion)

9. Never breathe the smoke produced when refrigerant contacts an open flame.

   (Phosgene gas or death)

10. Do not smoke when you are around R-12 exposed in the air.

Interaction Item # 5

B. Precautions or Hazards

1. Blindness

2. Suffocation

3. Phosgene gas
4. Explosion
5. Frostbite
6. Dirt
7. Explosion
8. Expansion
9. Phosgene gas/death
10. Breathe phosgene gas

III Summary and Conclusion

A. R-12 Refrigerant

B. Safety and Hazards When Servicing an Air Conditioning Unit

C. In working with an air conditioning unit you must be aware of the safety rules and the possibility of what might happen when you let yourself forget safety.

LESSON PLAN # 1

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning-Working Safety With Air Conditioning Units
(Unit Title)

INFORMATION TOPIC # 1 or DEMONSTRATION # ______

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Why should you wear eye protection?
2. What can cause the R-12 can to explode?
3. How is phosgene gas produced?
4. What is the most important factor in the service area?
5. How are the nine safety steps used in servicing the air conditioning unit?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Discuss why and explain the hazard of each of the safety rules used in servicing the air conditioning unit.
2. Discuss shop safety in typical working conditions.
3. Review interaction items.

LESSON PLAN # 1

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning-Working Safety With Air Conditioning Units
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Answer the following questions.

1. List four safety precautions and their hazards when handling R-12 refrigerant.

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2. List nine safety rules and their hazards relating to refrigeration service.

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LESSON PLAN # 2

LESSON PLAN FORMAT

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 Air Conditioning
(UNIT TITLE)

SCOPE OF UNIT:

In working with the air conditioning unit the student will demonstrate a knowledge and understanding of operation safety, special tools, troubleshooting for malfunction, evacuating and charging an air conditioning unit, and replacing defective parts.

INFORMATION TOPIC # 2 OR DEMONSTRATION # ____

Special Tools & Equipment

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 100% accuracy:

1. List the seven basic tools & equipment used on an air conditioning system.
2. Explain how the special tools & equipment are used.
3. Describe the functions of the different tools & equipment.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Overhead projector
Screen
Transparency-"Special Tools & Equipment"

	(Name)	(Date)	Special Learning Features For:
Written By:			Individual or
Instructional Delivery System By:			Small Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Johanning, Michael, editor. Air Conditioning - Fundamentals of Service, Third edition. Moline, IL: John Deere Fundamental Writing Service, 1979. Chapter 4, pages 35-42.

Stockel, Martin W. Auto Service and Repair. South Holland, IL: Goodheart-Willcox Company, Inc., 1978. Chapter 32, pages 772-779.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

This lesson today will help you identify the special tools and equipment that are used in today's air conditioning system, how each one works, and what part it plays in removing or replacing defective parts of the air conditioning system. It is essential if you want to service and repair a vehicle's unit that you know the function and use of these tools and equipment. After this lesson you will be able to use each item with understanding.

LESSON PLAN # 2

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

INFORMATION TOPIC # 2 (Technical - General - Guidance)

TITLE: Special Tools & Equipment

OUTLINE:

I Vacuum Pump

A. Functions: Remove Moisture & Air From the System

Interaction Item # 1

B. Used When the System Has Been Opened for Repairs

II Charging Hose

A. Function: Transfers the Freon from Container to the Manifold Gages

B. Use: Connect from the Manifold Gages and Container

Interaction Item # 2

C. Location: 1. Always the Central Hose on the Manifold
2. Other Hoses Used - Red for High Side; Blue for Low Side.

III Plastic Goggles

A. Always Wear for Protection of the Eyes - A Line or Fitting Could Fail

B. Must Fit Tightly on Face at the Eyes

C. Frostbite Can Occur to the Face or Eyes

Interaction Item # 3

IV Gauge and Manifold Set

A. Three Hoses

1. Low Gauge on Left
2. High Gauge on Right
3. Charging Hose

B. Use and Function

1. Check System's Working Conditions
2. Evacuate and Charge System

Interaction Item # 4

V Refrigerant Dispensing Can & Valve

A. Distribution

1. Can
2. Four Cans
3. 30 lb. Drum
4. Valve

B. Contains Freon for the Air Conditioning System

VI Thermometer

A. Function

1. Measure Outside Air Temperature
2. Measure How Cool the Air is Coming from Air Outlets

B. Use: Placed in the Air Conditioning Outlets to Read Temperature

VII Leak Detectors

A. Function: Find Leaks in the Air Flow System

B. Two Types Used in Most Shops

1. Propane Torch

a. Blue Flame Changes Color
b. Refrigerant R-12 is Picked Up

2. Electronic

a. Buzzer Sounds When Leak Detected
b. Caution: Use Only in Well-Ventilated Areas - Produces Phosgene Gas
c. Most Sensitive
d. Initial Cost
e. Handle With Care for Accurate Results

VIII Summary and Conclusion

A. Vacuum Pump - Air and Moisture

B. Charging Hoses - Transfer Freon

C. Plastic Goggles - Protection

D. Gage & Manifold Set - Working Condition of Unit

E. Dispensing Can - Holding Device

F. Thermometer - Measure Temperature Inside and Outside

G. Leak Detectors - Leaks of Freon

H. In learning how each of the seven basic tools and equipment are used, it will aid you in better servicing the air conditioning unit to meet manufacturer's specifications. Safety must be your first and upmost concern so that you not only service the air conditioning system to the customer's approval, but prevent injury to yourself and others.

LESSON PLAN # 2

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning-Special Tools & Equipment
(Unit Title)

INFORMATION TOPIC # 2 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is the main function and use of the vacuum pump?
2. What is the function of the charging hoses?
3. Why are the plastic goggles a must when working around the air conditioning system?
4. How are the manifold gages used?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

In the shop or classroom discussion identify the different tools and equipment that are used in the air conditioning system.

LESSON PLAN # 2

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Special Tools & Equipment

Directions: Read the question and list your response accordingly.

1. List the names and explain the use and purpose of the special tools and equipment used when servicing an air conditioning unit.

LESSON PLAN # 3

LESSON PLAN FORMAT

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 Air Conditioning

(UNIT TITLE)

SCOPE OF UNIT:

In working with the air conditioning unit the student will demonstrate a knowledge and understanding of operation safety, special tools, troubleshooting for malfunction, evacuating and charging an air conditioning unit, and replacing defective parts.

INFORMATION TOPIC # 3 OR DEMONSTRATION # ______

Troubleshooting An Air Conditioning System For Malfunctions

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

- Given the proper shop conditions:

  Identify air conditioning problems given the symptoms and/or indication on test gauges with 80% accuracy.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Transparencies of diagnostic chart
Overhead projector
Screen
Mock-up air conditioning unit
Air conditioning service kit

	(Name)	(Date)	Special Learning Features For:
Written By:			Individual or Small
Instructional Delivery System By:			Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Johanning, Michael, editor. Air Conditioning-Fundamentals of Service. Moline, IL: John Deere Fundamental Writing Services, 1979. Pages 35-68.

Stockel, Martin W. Auto Service and Repair. South Holland, IL: Goodheart-Willcox Company, Inc., 1978. Chapter 32, pages 771-787.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In other lessons you have learned how an air conditioning system operates. You have discharged, evacuated and recharged a system which increased your knowledge of the system. In this lesson we will discuss how to systematically locate the problem with a defective air conditioning unit.

LESSON PLAN # 3

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

INFORMATION TOPIC # 3 (Technical - General - Guidance)

TITLE: Troubleshooting An Air Conditioning System For Malfunctions

OUTLINE:

I Sensory Inspection (sight, sound, touch)

A. Pre-Checks

1. Inspect belt(s) for tightness.
2. Check for damaged belt(s).
3. Check for belt pulley alignment.
4. Check that compressor and other components are firmly mounted.
5. a) Check oily spots on lines and components that could indicate a leak in the system.
   b) Note these spots for further work and clean oily spots with a clean shop towel.
6. Clean debris from condensor and evaporator core.

Interaction Item # 1

B. If oily spots were found which may indicate a leak, perform a leak test at that spot.

1. Clear any vapor R-12 by blowing out compartment.
2. Provide good ventilation by opening doors or turning on fans.
3. Four leak detection methods:
   a) Colored dye additive to refrigerant.
      1. To detect slight leaks - dye color will appear at site of leak.
      2. Add dye to R-12 as you would lubrication.

   b) Liquid detergent-type detector.
      1. Apply around connector or suspected leak areas and look for bubbles to form.

   c) Electronic leak detector.
      1. Place detector pick-up at area in question. (note: Leak will be detected easier if you probe on the underside of the line or component and then move the probe up to find the exact leak).

        2. A leak is indicated by flashing light or high-pitched squeal from the detector.

    d) Propane torch leak detector.
        1. Heat copper reaction plate until it is glowing with a colorless to pale blue color.
        2. Adjust flame 3/8" above reaction plate.
        3. Place pick-up at suspected leak.
            a) A yellow-green color indicates a small leak.
            b) A blue color indicates a medium leak.
            c) A purple color indicates a large leak.

C. If a leak is found, repair it and recharge the system.

Interaction Item # 2

II Further Sensory Checks: Start engine and run air conditioner at maximum cooling for 15 minutes and make further sensory checks while system stabilizes.

Caution: Engine is RUNNING.

A. Compressor

1. Compressor engagement.
    a) Clutches.
    b) Thermostatic switches.

2. Noisy compressor.
    a) Bearing noise.
    b) Noise caused by liquid refrigerant entering low side.
    c) Other causes.

3. Frost formation.
    a) Frost build-up may be accompanied by noise in the compressor.
    b) Probable cause.
        1. Expansion valve.
        2. Evaporator thermostat connection.

Interaction Item # 3

B. Condensor

1. Should be clean and have air flowing through core.
2. Line from compressor should be hot.
3. Exit line to receiver should be warm.

C. Receive-Dryer

1. Should be warm.
2. Sight glass should be clear.
   a) Bubbles indicate low charge.
   b) Oily sight glass indicates no R-12 charge.

D. Expansion Valve

1. Line from receiver-dryer should be warmer than line going to evaporator.
2. Capillary tube connects to sensing element which must be in good contact with tail pipe or evaporator.
3. Frost formation causes:
   a) Water in refrigerant.
   b) Stuck expansion valve.
4. Whistling at expansion valve caused by under charge.

Interaction Item # 4

E. Evaporator

1. Blower and air duct operation.
2. Causes of frost formation:
   a) Restriction in line.
   b) Improper R-12 metering by expansion valve.

F. Mufflers: May or may not be in system.

G. Lines and Hoses

1. Check temperature of lines.
   a) Suction line: cool.
   b) Discharge line: hot.
   c) Liquid line: warm.
   d) Receiver-dryer: warm.
2. Restrictions.
   a) Frost build-up indicates a restriction in the line.

III Test Gauges

A. Test gauges provide another means of trouble finding. Pressure and vacuum valves coupled with other symptoms will pin-point a defective component.

B. Step-by-step procedure as outlined in John Deere publication, Air Conditioning-Fundamentals of Service, pages 47-64: chart.

IV Summary and Conclusion

A. Sensory Inspection (sight, sound, touch)

B. Further Sensory Checks

C. Test Gauges

D. Troubleshooting is an on-going instructional lesson. In the field you will continually learn new "tips" and shortcuts. Employers will expect you to know the basics presented in this lesson so they can be developed further with your experience on the job.

LESSON PLAN # 3

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit Title)

INFORMATION TOPIC # 3 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

Troubleshooting An Air Conditioning System For Malfunctions

1. Why are pre-checks necessary?
2. What are the four leak detection methods?
3. How many minutes should the engine run for maximum cooling?
4. How does frost formation flow in the expansion valve?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Classroom discussion - Instructor gives trainees an air conditioning problem to be diagnosed using procedure sheets.
2. On a live unit, practice troubleshooting procedures outlined in the lesson plan hand-outs and procedure manual until mastery. Then instructor will evaluate performance outcome.

LESSON PLAN # 3

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Troubleshooting An Air Conditioning System For Malfunctions

Directions: Read the following questions and list your responses accordingly.

1. What is the normal range for low side pressure in the system? ______________________________

2. Fill in the normal high side pressure ranges in the chart below.

Ambient Temperature	Normal High Side Pressure
80 deg. F (27 deg. C)	____________
90 deg. F (32 deg. C)	____________
95 deg. F (35 deg. C)	____________
100 deg. F (38 deg. C)	____________
105 deg. F (41 deg. C)	____________
110 deg. F (43 deg. C)	____________

3. Match the temperatures below with the components listed.

System Component	Normal Temperature
1. Expansion valve	a. Hot to the touch
2. Low side suction line	b. Warm to the touch
3. Compressor discharge valve	c. Cool to the touch

4. If the air conditioning system produces no cooling, generally what types of possible causes for the problem should be inspected first?

____

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5. List at least four symptoms that would be associated with an expansion valve stuck open.

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6. If the expansion valve is sticking open, the low side pressure would be ______________, and the high side pressure would be ______________.

7. The high side service valve on the compressor leads to the ______________. The low side valve leads from the ______________.

8. When inspecting the system, which side is normally warm to hot, and which side sweating to frosting?

____

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____

9. Is a slight refrigerant loss between seasons accepted as normal for an air conditioning system?

____

10. When adding refrigerant to the system, must it enter as a vapor or as a liquid?

____

11. When using an Electronic Leak Detector, what does a blinking light or squealing noise tell about the presence or absence of refrigerant?

____

____

LESSON PLAN # 4

LESSON PLAN FORMAT

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 Air Conditioning

(UNIT TITLE)

SCOPE OF UNIT:

In working with the air conditioning unit the student will demonstrate a knowledge and understanding of operation safety, special tools, troubleshooting for malfunction, evacuating and charging an air conditioning unit, and replacing defective parts.

INFORMATION TOPIC # 4 OR DEMONSTRATION #

Discharging, Evacuating and Charging Air Conditioner

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom instruction:

List in sequential order the steps of procedure used when discharging, evacuating and charging an air conditioner with 100% accuracy.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Live air conditioning system
Air conditioning service kit
Handtools

	(Name)	(Date)	Special Learning Features For:
Written By:			Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Johanning, Michael, editor. Air Conditioning-Fundamentals of Service. Moline, IL: John Deere Fundamental Writing Services, 1979. Pages 35-46, 65-70 and 88-92.

Stockel, Martin W. Auto Service and Repair. South Holland, IL: Goodheart-Willcox Company, Inc., 1978. Chapter 32, pages 772-780.

Handout: Steps of Procedure for Evacuating and Charging an Air Conditioner.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In prior lessons we learned the theory and operation of the air conditioner. We also learned the extra safety precautions to be used while working on an air conditioning unit. Today we will discharge, evacuate and charge an air conditioning system. Normal customer service may not require the system be discharged and evacuated. Evacuation is necessary after a system has been discharged and opened for service because air will enter the system before openings can be capped. The air that enters contains moisture which must be removed before it contaminates system components. The refrigerant in the system must be discharged or bled to release pressure before any lines or components are disconnected for service or if the refrigerant itself is contaminated.

LESSON PLAN # 4

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

INFORMATION TOPIC # 4 (Technical - General - Guidance)

TITLE: Discharging, Evacuating and Charging Air Conditioner

OUTLINE:

I Discharging the Air Conditioning Unit

A. Establish Safe Working Conditions.

1. Open doors or windows.
2. Turn on fans.
3. Extinguish open flame.

Interaction Item # 1

B. Remove High and Low Side Service Valve Caps.

Service valves may not be present if unit uses schrader valves.

C. Remove High and Low Side Gauge Port Caps.

D. Connect Test Hoses To Service Connectors.

1. Both hand valves on the gauge and manifold set must be CLOSED.
2. Make sure the low side test hose is connected to the suction line of the compressor (from the evaporator) and that the high side test hose is connected to the discharge line of the compressor (to the condensor).
3. Make test hose connections finger tight only.

Interaction Item # 2

E. Turn Service Valves to Mid-Position (two turns clockwise from back seat position) Using a Service Valve Wrench.

1. Remember that if the system uses a schrader valve in the service connector there will be no service valves.

F. Connect The Center Discharge Hose to The Gauge Set.

   1. Wrap a shop towel loosely around free end of hose.

Interaction Item # 3

G. SLOWLY Open High Side Manifold Valve and Allow Refrigerant to Discharge.

   WARNING: Observe all safety precautions while discharging refrigerant.

   1. Open valves only enough to bleed refrigerant. Too quick a discharge will draw oil from the system.

H. SLOWLY Open Low Side Manifold Valve When Pressure Falls Below 40 psi.

I. Close Both Valves When Pressures Read Zero And Refrigerant Stops Bleeding From Hose.

II Evacuating An Air Conditioning Unit

A. Connect Center Hose From Gauge Manifold to Vacuum Pump Connector.

B. Open the High and Low Side Gauge Manifold Hand Valve and Vacuum Pump Exhaust.

C. Turn Vacuum Pump On and Operate for a Minimum of 30 Minutes.

   1. System should pump down to 28-29½ inches of mercury in not over five minutes. If this does not occur, check all connections and leak test the system if necessary.

Interaction Item # 4

D. Close Gauge Manifold Hand Valves and Shut Off Vacuum Pump.

   1. Watch the compound gauge that it does not rise faster than 1 inch mercury in five minutes.

E. Disconnect Vacuum Hose From Manifold Gauge.

III Charging An Air Conditioning Unit

A. Screw Dispensing Valve to a Container of Refrigerant.

   1. Close valve.
   2. Pierce can with mechanism that is a part of the dispensing valve.

Interaction Item # 5

B. Connect Charging Hose To Dispensing Valve.

C. Connect Charging Hose Loosely to Center Connector on the Manifold Gauge Set.

D. Crack Open Dispensing Valve and Purge Air From Hose.

E. Tighten Charging Hose at Gauge Manifold and Close Dispensing Valve.

F. Open Dispensing Valve.

G. Open High Side Gauge Manifold Valve.

   1. Invert refrigerant container to allow refrigerant to enter high side of system.

Interaction Item # 6

H. When High Side Pressure Rise Slows, Open Low Side Gauge Manifold Valve.

I. When Low Side Pressure Rise Slows, Close High Side Gauge Manifold Valve and Dispensing Valve.

J. Start Engine and Adjust RPM to 1500-2000 RPM.

K. Adjust Air Conditioning Controls For Maximum Cooling.

L. Open Dispensing Valve to Allow Refrigerant Into System.

   1. Adjust low side pressure valve so gauge reading does not exceed 40 psi.

      Note: Be sure that the refrigerant enters the system as a VAPOR system and refrigerant should be 80 deg. F. or warmer.

M. Turn Off Dispensing Valve When Bubbles Disappear From Sight Glass.

   1. Low side pressure should be 7-30 psi.
   2. Close low side gauge manifold valve.

Interaction Item # 7

N. Open High Side Gauge Manifold Valve and Check Pressure.

   1. High side pressure should be 150-270 psi depending on ambient temperature.
   2. Close valve.

O. Turn Off Engine.

P. Remove Gauge Manifold From Compressor.

Do steps I - B, C, and D in reverse order.

IV Summary and Conclusion

A. Discharging the Air Conditioning Unit.

B. Evacuating the Air Conditioning Unit.

C. Charging the Air Conditioning Unit.

D. We will now proceed to the shop so you can apply this lesson to a live unit or mock-up. It is vitally essential to be cautious and apply safety while working in the shop area. Your carelessness could not only cost your employer hundreds of dollars but cause fatal injury to yourself or others.

LESSON PLAN # 4

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning-Discharging, Evacuating & Charging Air Conditioner
(Unit Title)

INFORMATION TOPIC # 4 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are safe working conditions and why are they important?
2. Is it important to have both hand valves on the gauge and manifold set closed? Why?
3. Why do you wrap a shop towel around the free end of the hose?
4. What specifications should the system pump down to when evacuating the system?
5. How do you pierce refrigerant can?
6. Why does the refrigerant need to be inverted?
7. Why, when checking the pressure, do you check the high or low side?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Using a live unit or a mock-up, discharge, evacuate and charge the air conditioning unit using the manufacturer's specifications and the steps of procedure outlined in this lesson plan. When you have practiced and reached mastery have instructor check your performance outcomes.

LESSON PLAN # 4

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Discharging, Evacuating and Charging Air Conditioner

Directions: List the steps of procedure when:

1. Discharging the air conditioning unit. ____

2. Evacuating the air conditioning unit. ____

3. Charging the air conditioning unit. ____

LESSON PLAN # 5

LESSON PLAN FORMAT

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 Air Conditioning

(UNIT TITLE)

SCOPE OF UNIT:

In working with the air conditioning unit the student will demonstrate a knowledge and understanding of operation safety, special tools, troubleshooting for malfunction, evacuating and charging an air conditioning unit, and replacing defective parts.

INFORMATION TOPIC # 5 OR DEMONSTRATION #

Removing and Replacing Defective
Air Conditioning Unit Components

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper shop conditions with 100% accuracy demonstrate a knowledge of techniques and procedures when removing and replacing defective parts by listing steps of procedure for removing the receiver drier and expansion valve.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Mock-up unit
Handouts - "Steps of Procedure"

	(Name)	(Date)	Special Learning Features For:
Written By:			Individual or Small
Instructional Delivery System By:	276		Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Johanning, Michael, editor. Air Conditioning-Fundamentals of Service. Moline, IL: John Deere Fundamental Writing Services, 1979.

Stockel, Martin W. Auto Service and Repair. South Holland, IL: Goodheart-Willcox Company, Inc., 1978.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Today we will discuss and practice removing and replacing faulty air conditioner components. It is important before we begin to reinforce "safety" procedures. You must always be aware of safety as the air conditioning system can be very dangerous if safety rules are not followed. At the conclusion of this lesson plan you will be able to remove and replace the receiver drier and the expansion valve.

LESSON PLAN # 5

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit or Block Title)

INFORMATION TOPIC # 5 (Technical - General - Guidance)

TITLE: Removing and Replacing Defective
Air Conditioning Unit Components

OUTLINE:

I Removing and Replacing the Receiver Dryer

- A. Discharging the Air Conditioning System.
- B. Removing the Receiver Dryer

  (unbolt or screw)
- C. Installing or Reinstalling a New Receiver Dryer.
- D. Using Manufacturer's Specifications - Add Refrigerant Oil.
- E. Evacuating System With A Vacuum Pump.
- F. Charging the System With Refrigerant R-12 or Freon.

II Removing and Replacing the Expansion Valve

- A. Discharging the System.
- B. Removing the Expansion Valve Inlet Screen For Inspection.
- C. If Screen is Dirty, It Should Be Replaced.
- D. Installing a New Receiver Dryer.
- E. Using Manufacturer's Specifications - Add Refrigerant Oil.
- F. Replacing the Expansion Valve.
- G. Connecting All Components.
- H. Evacuating the System.
- I. Charging the System With Refrigerant R-12 or Freon.

III Summary and Conclusion

A. Removing The Receiver Dryer.

B. Removing The Expansion Valve.

C. The receiver dryer and the expansion valve are the two most frequent components to be replaced in the air conditioning unit. Most diesel trucks now come equipped with air conditioning. This instructional lesson will introduce a newly demanded area of diesel mechanics.

LESSON PLAN # 5

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 — Air Conditioning
(Unit Title)

INFORMATION TOPIC # 5 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

Removing and Replacing Defective
Air Conditioning Unit Components

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Discuss the steps of procedure in removing the dryer and the expansion valve in the air conditioning unit.

2. Using the outline and the manufacturer's specifications, practice procedures of removing and replacing the receiver dryer and the expansion valve on a live unit or mock-up. Once you have mastered these procedures the instructor will check your performance outcome.

LESSON PLAN # 5

COURSE TITLE/NO. Diesel Mechanics

UNIT # 1 **—** Air Conditioning
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Removing and Replacing Defective
Air Conditioning Unit Components

Directions: Answer the following questions.

1. List, in sequential order, the six steps of procedure used in removing the receiver dryer.

2. List, in sequential order, the nine steps of procedure used in removing the expansion valve.

JOB DESCRIPTIONS

FOOD SERVICE AND MANAGEMENT

TITLE	DOT NUMBER	JOB DESCRIPTION
Food and Beverage Service (Informal Waiter/ Waitress)	311.477-030	Serves food to patrons at counters and tables of coffeeshops, lunchrooms, and other dining establishments where food service is informal. Presents menu, answers questions, and makes suggestions regarding food and service. Writes order on check. Relays order to kitchen and serves courses from kitchen and service bars. Observes guests to fulfill any additional request and to perceive when meal has been completed. May ladle soup, toss salads, portion pies and desserts, brew coffee, and perform other services as determined by establishment's size and practices. May clear and reset counters or tables at conclusion of each course.
Prep Cook/ Line Cook (Cook)	313.361-014	Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in hotels and restaurants. Adjusts thermostat controls to regulate temperature of ovens, broilers, grills, roasters, and steam kettles. Measures and mixes ingredients according to recipe, using variety of kitchen utensils and equipment, such as blenders, mixers, grinders, slicers, and tenderizers, to prepare soups, salads, gravies, desserts, sauces, and casseroles. Bakes, roasts, broils, and steams meats, fish, vegetables, and other foods. Adds seasoning to foods during mixing or cooking, according to personal judgment and experience. Observes and tests food being cooked by tasting, smelling, and piercing with fork to determine that it is cooked. Carves meats, portions food on serving plates, adds gravies, sauces, and garnishes servings to fill orders. May supervise other cooks and kitchen employees. May wash, peel, cut, and shred vegetables and fruits to prepare them for use. May butcher chickens, fish, and shellfish. May cut, trim, and bone meat prior to cooking. May bake bread, rolls, cakes, and

		pastry. May prepare and cook meals for institutionalized patients requiring special diets. May be designated duties of back-up cook, fry cook, grill cook, broil cook or assembler.
Ware Washer (Kitchen Helper)	318.687-010	Performs any combination of the following duties to maintain kitchen work areas and restaurant equipment and utensils in clean and orderly condition: Sweeps and mops floors. Washes worktables, walls, refrigerators, and meat blocks. Segregates and removes trash and garbage and places it in designated containers. Steam-cleans or hoses-out garbage cans. Sorts bottles, and breaks disposable ones in bottle-crushing machine. Washes pots, pans, and trays by hand. Scrapes food from dirty dishes and washes them by hand or places them in racks or on conveyor to dishwashing machine. Transfers supplies and equipment between storage and work areas by hand or by use of handtruck. Washes and peels vegetables, using knife or peeling machine. May be known according to tasks as: dish machine operator or pot sink operator.
Cashier	211.462-010	TRAINING PENDING ON EQUIPMENT PURCHASE Receives cash from customers or employees in payment for goods or services and records amounts received. Recomputes or computes bill, itemized lists, and tickets showing amount due, using adding machine or cash register. Makes change, cashes checks, and issues receipts or tickets to customers. Records amounts received and prepares reports of transactions. Reads and records totals shown on cash register tape and verifies against cash on hand. May be required to know value and features of items for which money is received. May sell candy, cigarettes, gum, and gift certificates, and issue trading stamps. Usually employed in restaurants and cafeterias.

Kitchen Manager (Kitchen Supervisor)	310.137-014	PROGRAM WILL BE EXPANDED IN THE AREA OF MANAGEMENT AS FUNDING IS AVAILABLE Supervises and coordinates activities of kitchen, pantry, and storeroom personnel and requisitions foodstuffs and kitchen supplies. Plans or participates in planning menus, preparing and apportioning foods, and utilizing food surpluses and leftovers. Specifies number of servings to be made from any vegetable, meat, beverage, and dessert to control portion costs. Supervises noncooking personnel to insure cleanliness of kitchen and equipment. Exercises general supervision over cooks. Hires and discharges employees. Posts employee time and production records. Supervises workers engaged in inventory, storage, and distribution of foodstuffs and supplies.
Dining Room Manager Seating Host/ Hostess (Restaurant Host/ Hostess)	310.137-010	Supervises and coordinates activities of dining room personnel to provide fast and courteous service to patrons. Schedules dining reservations and arranges parties or special services for diners. Greets guests, escorts them to tables, and provides menus. Adjusts complaints of patrons. Assigns work tasks and coordinates activities of dining room personnel to insure prompt and courteous service to patrons. Inspects dining room serving stations for neatness and cleanliness, and requisitions table linens and other dining room supplies for tables and serving stations. May interview, hire, and discharge dining room personnel. May train dining room employees. May schedule work hours and keep time records of dining room workers. May assist in planning menus. May act as cashier.
Restaurant Manager (Food Service Manager)	187.167-106	Coordinates food service activities of hotel, restaurant, or other similar establishment or at social functions. Estimates food and beverage costs and requisitions or purchases supplies. Confers with food preparation and other personnel to plan menus and related activities, such as dining room, bar, and banquet operations. Directs hiring and assignment of personnel. Investigates and resolves food quality and service complaints.

Bartender	312.474-010	Mixes and serves alcoholic and nonalcoholic drinks to patrons of bar, following standard recipes. Mixes ingredients, such as liquor, soda, water, sugar, and bitters, to prepare cocktails and other drinks. Serves wine and draught or bottled beer. Collects money for drinks served. Orders or requisitions liquors and supplies. Places bottled goods and glasses to make attractive display. May slice and pit fruit for garnishing drinks. May prepare appetizers, such as pickles, cheese, and cold meats.
Utility Person (Commercial/ Institutional Cleaner)	381.687-014	Keeps premises of restaurant in clean and orderly condition. Cleans and polishes lighting fixtures and marble surfaces. May cut and trim grass, and shovel snow, using power equipment or handtools. May deliver messages. May transport small equipment or tools between departments. Other miscellaneous duties as assigned.
Working Conditions (Hourly)		Some restaurant employees work split shifts; that is, they work for several hours in the morning, take a few hours off in the afternoon, and then return to their jobs for the evening hours. Most are expected to work on holidays and weekends. The wide range in dining hours creates a good opportunity for part-time work. Restaurant employees stand most of the time and have to carry heavy items during the course of their duties. The work is relatively safe, but they must be careful to avoid slips or falls and burns.
Working Conditions (Salaried)		The same working conditions for hourly employees; however, management may work long hours, often staying after regular store hours to check work schedules, plan merchandising strategy, take inventory, or do paperwork. Successful store operation often depends on the manager's ability to delegate responsibility to assistants who run the store in his or her absence and to be responsive to customer's needs.
Salary Ranges		Salary ranges for restaurant personnel are as follows: Servers, $2.00 - $5.00 per hour plus tips; Cooks, $3.35 - $8.00 per hour; Kitchen Helpers, $3.35 - $5.00 per hour; Cashiers, $3.35 - $6.00 per hour; Bartenders, $3.35 - $8.00 per hour plus tips; and Utility Persons, $3.35 - $5.00 per hour. Kitchen Supervisors and Dining Room Managers may be hourly employees or salaried, with an annual income of $10,000 - $20,000 per year. Restaurant Managers are salaried personnel with an annual income of $12,000 - $40,000 per year.

FOOD SERVICE

TASK ANALYSIS

1. Open, operate and close 3-comparment sink.
2. Wash cookware and portable machinery.
3. Open and close the dish machine station.
4. Operate dish machine.
5. Open the grill station.
6. Grill meat to service menu.
7. Grill bread to service menu.
8. Grill eggs to service menu.
9. Clean and close the grill station.
10. Open the broil station.
11. Broil meat to service menu.
12. Broil vegetables to service menu.
13. Broil fish to service menu.
14. Broil casseroles to service menu.
15. Broil eggs to service menu.
16. Broil poultry to service menu.
17. Clean and close the broil station.
18. Set-up sandwich bar.
19. Fill and activate steam table.
20. Assemble foods.

21. Manage orders.

22. Clean and close the assembler's station.

23. Prepare pastries for preparation area.

24. Prepare entrees for preparation area.

25. Prepare vegetables for preparation area.

26. Prepare salads to service menu.

27. Prepare vegetables to service menu.

28. Prepare meats to service menu.

29. Prepare pastries to service menu.

30. Clean and close the preparation area.

31. Set-up service area.

32. Serve food and beverage.

33. Service customers.

34. Clean and close the service area.

35. Set-up back-up station.

36. Service front and back of the house as directed.

37. Store shipments received.

38. Clean and close back-up station.

39. Open the fry station.

40. Deep fry meat necessary to service menu.

41. Deep fry poultry necessary to service menu.

42. Deep fry fish necessary to service menu.

43. Deep fry vegetables necessary to service menu.

44. Clean and close the fry station.

FOOD SERVICE

TASK ANALYSIS

General Units

1. Human Relations - Team Work.
2. Safety.
3. Techniques of acquiring employment.
4. Work Habits - High Standards.
5. Sanitation of food handling.
6. Personal hygiene.

Machinery and Utensil Maintenance

1. Open, operate and close the pot sink.
2. Open, operate and close the dish station.

Grill Cook

1. Open the grill station.
2. Grill meat to service menu.
3. Grill bread to service menu.
4. Grill eggs to service menu.
5. Clean and close the grill station.

Broil Cook

1. Open the broil station.
2. Broil meat to service menu.
3. Broil vegetables to service menu.
4. Broil fish to service menu.
5. Broil casseroles to service menu.
6. Broil eggs to service menu.
7. Broil poultry to service menu.
8. Clean and close the broil station.

Assembler

1. Set-up sandwich bar.

2. Fill and activate steam table.
3. Assemble foods.
4. Manage orders.
5. Clean and close the assembler's station.

Prep Cook

1. Prepare pastries for preparation area.
2. Prepare entrees for preparation area.
3. Prepare vegetables for preparation area.
4. Prepare salads to service menu.
5. Prepare meats to service menu.
6. Prepare pastries to service menu.
7. Prepare vegetables to service menu.
8. Clean and close the preparation area.

Food Server

1. Set-up service area.
2. Serve food and beverages.
3. Service customers.
4. Clean and close the service area.

Back-Up Person

1. Set-up back-up station.
2. Service front and back of the house as directed.
3. Store shipments received.
4. Clean and close the back-up station.

Fry Cook

1. Open the fry station.
2. Deep fry meat to service menu.
3. Deep fry poultry to service menu.
4. Deep fry fish to service menu.
5. Deep fry vegetables to service menu.
6. Clean and close the fry station.

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: General Unit

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Human Relations - Team Work
	2. Safety
	3. Techniques of Acquiring Employment
	4. Work Habits and High Standards
	5. Sanitation of Food Handling
	6. Personal Hygiene

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Machinery and Utensil Maintenance

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Opening, Operating and Closing the the 3-Compartment Pot Sink
2. Open, Operate, and Close the 3-Compartment Sink	
	3. The Dish Machine
4. Open the Dish Station	
5. Operate the Dish Station	
6. Close the Dish Station	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Grill Cook

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	1. Types of Grills Used in Commercial Food
	2. The Working Tools of the Grill
	3. Opening Grill Station
4. Open Grill Station	
	5. Temperature Settings in Zones on the Grill for Various Foods
	6. Determining Doneness of Grilled Food
	7. Food Handling on the Grill Station
8. Grill Meat to Service Menu	
9. Grill Bread to Service Menu	
10. Grill Eggs to Service Menu	
	11. Preservation of the Grill Surface
	12. Cleaning and Closing the Grill Station
13. Clean and Close the Grill Station	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Broil Cook

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Broiling as a Means of Cooking
	2. Stock Broil Station
3. Open the Broil Station	
	4. Broiling and Accessories
	5. Refrigeration and Storage of Food During the Meal
	6. Broiling to Service Menu
7. Broil Meat to Service Menu	
8. Broil Vegetables to Service Menu	
9. Broil Fish to Service Menu	
10. Broil Casseroles to Service Menu	
11. Broil Eggs to Service Menu	
12. Broil Poultry to Service Menu	
	13. Cleaning and Closing Broil Station
14. Clean and Close Broil Station	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Assembler

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	1. Sandwich Preparation
2. Set-Up the Sandwich Bar	
	3. The Steam Table and Counter Appliances
4. Fill and Activate the Steam Table	
	5. Assembler's Ability to Keep His Cool
	6. Food That is Acceptable For Service to Customer
7. Assemble Foods	
	8. Managing the Order Through Kitchen
9. Manage Orders	
	10. Securing the Assembler's Station
11. Clean and Close the Assembler's Station	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Prep Cook

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Kitchen and Equipment Safety and Operation
	2. Recipies Using Weights, Measures, and Conversions
	3. Food Handling
4. Prepare Pastries for Preparation Area	
5. Prepare Entrees for Preparation Area	
6. Prepare Vegetables for Preparation Area	
	7. Preparing Salads to Service Menu
8. Prepare Salads to Service Menu	
	9. Preparing Vegetables to Service Menu
10. Prepare Vegetables to Service Menu	
	11. Preparing Meat to Service Menu
12. Prepare Meat to Service Menu	
	13. Preparing Pastries to Service Menu
14. Prepare Pastries to Service Menu	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Prep Cook (continued)

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	15. Sanitary Food Storage
	16. Proper Cleaning of Work and Pastry Tables
	17. Securing Heat Sources Used for Preparation
	18. Securing Motorized Equipment
19. Clean and Close the Preparation Area	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Food Server

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Garnishes and Condiments
	2. Machinery and Equipment Used in the Service Area
	3. Preparing the Dining Room Service
	4. Preparing the Pick-Up Station
5. Set-Up the Service Area	
	6. Taking the Food and Beverage Order
	7. Menu Abbreviations, Prices and Portions
	8. The Server's Relationship with the Kitchen and Other Servers
	9. Station Plans and Server Rotation
10. Serving Food and Beverages	
	11. Grooming for Food and Beverage Servers
	12. Concern for the Customer's Comfort and Time Schedule (Tips)
	13. Turning Your Station
	14. Suggestive Selling Techniques
15. Service Customers	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Food Server (continued)

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	16. What is Side Work and How is it Assigned
	17. Bussing the Table Properly
	18. When Your Station Closes
	19. Dismantling the Service Area
20. Clean and Close the Service Area and Station	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Back-Up Person

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	1. Back-Up Responsibilities in the Kitchen
2. Set-Up Back-Up Station	
	3. Serving the Front and Back of the House
4. Service Front of House as Directed	
5. Service Back of House as Directed	
	6. Accepting Shipments
	7. Proper Set-Up of Storage Facilities
8. Store Shipments Received	
	9. Back-Up Station
	10. Clean and Close Schedule
11. Close the Back-Up Station	

INSTRUCTIONAL ANALYSIS

Course: Food Service

Unit: Fry Cook

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. The Commercial Deep Fryer
	2. The Working Tools and Equipment of the Fry Station
	3. Opening the Fry Station
4. Open the Fry Station	
	5. Breading, Types and Functions
	6. Deep Fry Cooking Temperatures
	7. Food Handling on the Fry Station
8. Deep Fry Meats to Service Menu	
9. Deep Fry Poultry to Service Menu	
10. Deep Fry Fish to Service Menu	
11. Deep Fry Vegetables to Service Menu	
	12. Handling and Disposing of Hot Grease
13. Close the Fry Station	

LESSON PLAN # 1

LESSON PLAN FORMAT

COURSE TITLE/NO. Food Service and Management

UNIT # I Machinery and Utensil Maintenance

(UNIT TITLE)

SCOPE OF UNIT:

The purpose of this unit is to train the tableware and cookware washer to clean, assemble, disassemble and operate a typical dish machine and three-compartment sink independently.

INFORMATION TOPIC # 1 OR DEMONSTRATION # ______

Opening, Operating, and Closing
the Three-Compartment Sink

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Identify the specific detergent for washing cookware.
2. Identify the specific sanitizer for sanitizing cookware.
3. List the sequence of set-up of the three-compartment sink.
4. Identify the proper time to change solutions in the three-compartment sink.
5. List the methods of storing cooking utensils.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Handout-"Three-Compartment Stainless Steel Sink"

	(Name)	(Date)	Special Learning Features For:
Written By:	Hintz	5/26/82	Individual or Small
Instructional Delivery System By:	301		Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

REFERENCES: (BIBLIOGRAPHY DATA)

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The operation of the three-compartment sink must be done in a systematic manner. Without producing the necessary water temperatures and solutions, the three-compartment sink can be dangerous.

LESSON PLAN # 1

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit or Block Title)

INFORMATION TOPIC # 1 (Technical - General - Guidance)

TITLE: Opening, Operating, and Closing the Three-Compartment Sink

OUTLINE:

I Introduction to the Three-Compartment Sink

- A. Chemicals and Water
- B. Detergents - Differences
- C. Sanitizer
    1. Oxydizer
    2. Germicide

(Interaction Items # 1 and # 2)

II Open the Three-Compartment Sink

- A. Water Temperatures in the Three Compartments
- B. Adding Detergent
- C. Adding Sanitizer

(Interaction Item # 3)

III Operating the Three-Compartment Sink

(Interaction Item # 4)

- A. Solution Changes
- B. Pre-Soak
- C. Abrasives
    1. Powders
    2. Liquids
    3. Pads

D. Disassemble and Assemble Portable Machinery

   1. Meat Slicer
   2. Food Chopper
   3. Food Processor
   4. Mixers

E. Safely Handling Dangerous Utensils

(Interaction Item # 5)

IV Closing the Three-Compartment Sink

A. Cleaning the Sink

B. Storing Cookware

C. Polishing With Food Grade Stainless Steel Polish

V Summary and Conclusion

A. Introduction

B. Opening the Three-Compartment Sink

C. Operating the Three-Compartment Sink

D. Closing the Three-Compartment Sink

E. The operation of the three-compartment sink may appear to be a mindless job. However, the prevention of disease and safety of your customer begins with properly cleaned and sanitized cookware.

LESSON PLAN # 1

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit Title)

INFORMATION TOPIC # 1 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Why is it important to stop corrosiveness? (Aluminum-Stainless Steel)

   Explain: a. Ph
      1. Alkaline
      2. Acid

2. What are emulsifiers?

3. What are the effects of hot and cold sanitizers?

4. Why is it important to pre-rinse?

5. Why is air drying important?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Tour of the three-compartment sink area.

LESSON PLAN # 1

COURSE TITLE/NO. Food Service and Management

UNIT # I **—** Machinery and Utensil Maintenance
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Fill in the blanks in the following questions.

1. Cookware will be washed in a __________ __________ detergent.

2. Sanitizers are either ____________ or ____________.

3. List the sequence of setting up a three compartment sink from left to right.

   a. ____________ in the right compartment.

   b. ____________ in the center compartment.

   c. ____________ in the left compartment.

4. It is time to change solution in the three compartment sink when a ____________ ____________ forms over the surface of the solution.

5. How should the following utensils be stored?

   a. Knives ______________________________.

   b. Pots and pans ______________________________.

   c. Whips and spoons ______________________________.

   d. Scoops and spatulas ______________________________.

   e. Cutting boards and sheet pans ____________________
   ______________________________.

LESSON PLAN # 2

LESSON PLAN FORMAT

COURSE TITLE/NO. Food Service and Management

UNIT # I Cookware Washer

(UNIT TITLE)

SCOPE OF UNIT:

The purpose of this unit is to train the tableware and cookware washer to clean, assemble, disassemble and operate a typical dish machine and three compartment sink independently.

INFORMATION TOPIC # ______ OR DEMONSTRATION # 2

Open, Operate and Close the Three-Compartment Sink

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper working conditions with 100% accuracy set up, operate, and close the three-compartment sink.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Three-Compartment Stainless Steel Sink
Detergent
Sanitizer
Abrasives

	(Name)	(Date)	Special Learning Features For:
Written By:	Hintz	5/27/82	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

REFERENCES: (BIBLIOGRAPHY DATA)

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The three-compartment sink must be operated in an organized manner. If the steps of the procedure are followed, you will produce clean, germ-free cookware, ready for use in the kitchen.

LESSON PLAN # 2

COURSE TITLE/NO. Food Service and Management

UNIT # I — Cookware Washer
(Unit or Block Title)

DEMONSTRATION # 2 (MANIPULATIVE OPERATIONS)

TITLE: Open, Operate and Close the Three-Compartment Sink

STEPS OF PROCEDURE:

1. Fill right compartment 3/4 full of water.
   Note: As hot as you can tolerate without pain.
2. Mix detergent.
   Note: Quantity depending on brand used.
3. Fill middle compartment 3/4 full of warm clear rinse water.
4. Fill left compartment 3/4 full of warm water.
5. Add bleach or sanitizer.
   Note: Quantity determined by type used.
6. Fill "hard to clean" pots with hot soapy water and let stand to soften.
   Caution: Wash sharp utensils individually.
7. Rinse washed utensils in center compartment.
8. Sanitize rinsed utensils in left compartment for the prescribed time.
   Note: Depending on the chemical used.
9. Place parts and utensils on the left drain board to air dry.

LESSON PLAN # 2

COURSE TITLE/NO. Food Service and Management

UNIT # I **—** Cookware Washer
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Student: ______________________

	Yes	No
1. Fill right compartment 3/4 full of water.	____	____
2. Mix detergent.	____	____
3. Fill middle compartment 3/4 full of warm clear rinse water.	____	____
4. Fill left compartment 3/4 full of warm water.	____	____
5. Add bleach or sanitizer.	____	____
6. Fill "hard to clean" pots with hot soapy water and let stand to soften. Caution: Wash sharp utensils individually.	____	____
7. Rinse washed utensils in center compartment.	____	____
8. Sanitize rinsed utensils in left compartment for the prescribed time.	____	____
9. Place parts and utensils on the left drain board to air dry.	____	____

Teacher: ______________________

Date: ______________________

LESSON PLAN # 3

LESSON PLAN FORMAT

COURSE TITLE/NO. Food Service and Management

UNIT # I Machinery and Utensil Maintenance

(UNIT TITLE)

SCOPE OF UNIT: The purpose of this unit is to train the tableware and cookware washer to clean, assemble, disassemble, and operate a typical dish machine and three-compartment sink independently.

INFORMATION TOPIC # 3 OR DEMONSTRATION #

The Dish Machine

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Explain the effects of water temperatures.
2. Explain the effects of corrosive chemicals.
3. Explain the function of a rinse agent.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Handout-"Dish Machine Diagram"

	(Name)	(Date)	Special Learning Features For:
Written By:	Hintz	5/28/82	Individual or Small Group Instruction
Instructional Delivery System By:	311		

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

REFERENCES: (BIBLIOGRAPHY DATA)

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The operation of the dish machine is a simple task; however, it must be done in a systematic manner with an awareness of all the water temperatures and chemical solutions used to produce clean germ-free tableware.

LESSON PLAN # 3

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit or Block Title)

INFORMATION TOPIC # 3 (Technical - General - Guidance)

TITLE: The Dish Machine

OUTLINE:

I Water Temperatures

- A. Cleansing
    - 1. Low temperature
    - 2. High temperature

    (Interaction Item # 1)

- B. Sanitizing
    - 1. High temperature
    - 2. Low temperature

    (Interaction Item # 2)

- C. Safety When Using High Temperature Water

II Chemicals

- A. Cleansing
    - 1. pH
        - a. Effects on metal
        - b. Effects on china
    - 2. Soft water

    (Interaction Item # 3)

- B. Sanitizing
    - 1. Low temperature systems
- C. Rinse
    - 1. Wetting agents
        - a. Surface tension

D. Safety When Using Caustic Chemical

III Pre-Rinse

A. Contamination

1. Wash water

B. Sanitation

1. Related to high temperatures

C. Cooking Utensils

IV Hot Water Supply

A. Hot Water System

B. Rinse Water

1. Super heater

2. Recirculating pump

(Interaction Item # 4)

V Pre-Soak Silverware

A. Dish Detergent Solution (strong)

B. Sorted in Cylinders

C. Unsorted (emergency only)

(Interaction Item # 5)

VI Mechanics of the Dish Machine (handout)

A. Location of Unmovable Appliances

B. Location of Items to be Assembled and Disassembled

VII Summary and Closure

A. Water Temperatures

B. Chemicals

C. Pre-Rinse

D. Hot Water Supply

E. Pre-Soak Silverware

F. Mechanics of the Dish Machine

G. The successful operation of the entire restaurant is at times affected by the degree of attention paid to the proper procedure for washing and sanitizing tableware.

LESSON PLAN # 3

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit Title)

INFORMATION TOPIC # 3 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Why are these significant? (water temperatures)
2. What other types of machinery are available?
3. What are the advantages of soft water?
4. When is a recirculating pump needed?
5. What is servable silver?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Discuss Dish Machine Diagram.
2. Tour Dish Machine area comparing diagram to machinery.

LESSON PLAN # 3

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: In your own words answer the following questions.

1. Water temperature in the wash cycle controls the:

2. Water temperatures in excess of 195 degrees cause:

3 Explain why carbon steel and aluminum utensils are not washed in the dish machine:

4. What is the function of a rinse agent?

5. How do we obtain the 180 degrees rinse water?

LESSON PLAN # 4

LESSON PLAN FORMAT

COURSE TITLE/ÑO. Food Service and Management

UNIT # I Machinery and Utensil Maintenance

(UNIT TITLE)

SCOPE OF UNIT: The purpose of this unit is to train the tableware and cookware washer to clean, assemble, disassemble and operate a typical dish machine and three-compartment sink independently.

INFORMATION TOPIC # ________ OR DEMONSTRATION # 4

Open the Dish Machine Station

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper working conditions with 100% accuracy, open the dish machine station using each step of the procedure in sequential order.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Hobart Dish Machine - Model AM-9T2

Detergent

Rinse Agent

	(Name)	(Date)	Special Learning Features For:
Written By:	Hintz	6/1/82	Individual or Small
			Group Instruction
Instructional Delivery System By:	317		

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Dish Machine Diagram

REFERENCES: (BIBLIOGRAPHY DATA)

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Keep in mind the importance of water temperatures, wash chemicals, and rinse agents. Using the temperature gauges and making sure there is an adequate supply of all chemical agents will insure proper functioning of equipment.

LESSON PLAN # 4

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit or Block Title)

DEMONSTRATION # 4 (MANIPULATIVE OPERATIONS)

TITLE: Open the Dish Machine Station

STEPS OF PROCEDURE:

1. Reassemble Upper Wash Arms
2. Reassemble Lower Wash Arms
3. Install Upper Wash Arm
4. Install (4) Upper Rinse Nozzles and Defusers
5. Install (2) Scrap Trays
6. Install Lower Wash Arm
7. Install Rinse Arm Pivot
8. Install Rinse Arm
9. Check Detergent Level
10. Check Rinse Agent Level
11. Close Drain
12. Fill Machine With Water
    Note: Over Scrap Trays
13. Turn On Tank Heat
14. Turn On Super Heater
15. Close Loading Doors
16. Cycle Machine
17. Check Wash Temperature: 140 degrees
    Note: Check Gauge During Wash Cycle
18. Check Detergent Pump
19. Check Rinse Temperature: 180 - 195 degrees
20. Check Rinse Agent Pump
21. Check Garbage Disposal For Obstructions

LESSON PLAN # 4

COURSE TITLE/NO. Food Service and Management

UNIT # I **—** Machinery and Utensil Maintenance
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Student's Name ____________________

Open the Dish Machine Station

		Yes	No
1. Reassemble Upper Wash Arms	1.	___	___
2. Reassemble Lower Wash Arms	2.	___	___
3. Install Upper Wash Arm	3.	___	___
4. Install (4) Upper Rinse Nozzles and Defusers	4.	___	___
5. Install (2) Scrap Trays	5.	___	___
6. Install Lower Wash Arm	6.	___	___
7. Install Rinse Arm Pivot	7.	___	___
8. Install Rinse Arm	8.	___	___
9. Check Detergent Level	9.	___	___
10. Check Rinse Agent Level	10.	___	___
11. Close Drain	11.	___	___
12. Fill Machine With Water Note: Over Scrap Trays	12.	___	___
13. Turn On Tank Heat	13.	___	___
14. Turn On Super Heater	14.	___	___
15. Close Loading Doors	15.	___	___
16. Cycle Machine	16.	___	___
17. Check Wash Temperature: 140 degrees	17.	___	___
18. Check Detergent Pump	18.	___	___
19. Check Rinse Temperature: 180 - 195 degrees	19.	___	___
20. Check Rinse Agent Pump	20.	___	___
21. Check Garbage Disposal For Obstructions	21.	___	___

Instructor's Name ____________

Date ____________________

LESSON PLAN # 5

LESSON PLAN FORMAT

COURSE TITLE/NO. Food Service and Management

UNIT # I Machinery and Utensil Maintenance

(UNIT TITLE)

SCOPE OF UNIT:

The purpose of this unit is to train the tableware and cookware washer to clean, assemble, disassemble and operate a typical dish machine and three-compartment sink independently.

INFORMATION TOPIC # ______ OR DEMONSTRATION # 5

Operate the Dish Machine

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper working conditions with 100% accuracy, operate the dish machine safely in conformance with health codes.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Hobart Dish Machine Model AM-9T2

Handout-"Dish Machine Diagram"

	(Name)	(Date)	Special Learning Features For:
Written By:	Hintz	6/1/82	Individual or Small
Instructional Delivery System By:			Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

REFERENCES: (BIBLIOGRAPHY DATA)

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

If the step by step procedure is followed, you will control the spread of bacteria and keep the loss of tableware to a minimum.

LESSON PLAN # 5

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit or Block Title)

DEMONSTRATION # 5 **(MANIPULATIVE OPERATIONS)**

TITLE: Operate the Dish Machine

STEPS OF PROCEDURE:

1. Sort Silver into Pre-Soak
2. Empty Cups and Glasses
3. Rack China
4. Pre-Rinse China
5. Pick Paper Out of Bus Tub
6. Dispose of Paper
7. Check for Loose Silver
8. Dump Remainder of Garbage into Garbage Disposer
9. Open Access Door to Dish Machine
10. Push Rack of Dishes into Machine
11. Close Access Door
12. Depress Wash Cycle Switch
13. Check Wash Water Temperature: 140 - 160 degrees
14. Check Rinse Temperature During Rinse Cycle: 180 - 195 degrees
15. Open Access Door After Rinse Cycle
    Caution: Keep Head and Face Away From Escaping Steam
16. Push Rack of Dirty Dishes into Machine
    Note: Rack Will Be Pushed Out Automatically
    When Finished
17. Take Tableware Out of Dish Machine
18. Allow Tableware to Remain on Drainboard for Several Minutes
    to Air Dry
19. Visually Check for Cleanliness
20. Store Silver in Cylinders
    Note: Mouth Contact Service Down
21. Store Glass in Racks in Lowerators
    Note: Inverted
22. Store China in China Cabinet or on Dish Shelf on the Line

LESSON PLAN # 5

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Student's Name ______________________

Operate the Dish Machine

			Yes	No
1.	Sort Silver into Pre-Soak	1.	___	___
2.	Empty Cups and Glasses	2.	___	___
3.	Rack China	3.	___	___
4.	Pre-Rinse China	4.	___	___
5.	Pick Paper Out of Bus Tub	5.	___	___
6.	Dispose of Paper	6.	___	___
7.	Check for Loose Silver	7.	___	___
8.	Dump Remainder of Garbage into Garbage Disposer	8.	___	___
9.	Open Access Door to Dish Machine	9.	___	___
10.	Push Rack of Dishes into Machine	10.	___	___
11.	Close Access Door	11.	___	___
12.	Depress Wash Cycle Switch	12.	___	___
13.	Check Wash Water Temperature: 140 - 160 degrees	13.	___	___
14.	Check Rinse Temperature During Rinse Cycle: 180 - 195 degrees	14.	___	___
15.	Open Access Door After Rinse Cycle	15.	___	___
16.	Push Rack of Dirty Dishes into Machine	16.	___	___
17.	Take Tableware Out of Dish Machine	17.	___	___
18.	Allow Tableware to Remain on Drainboard for Several Minutes to Air Dry	18.	___	___
19.	Visually Check for Cleanliness	19.	___	___
20.	Store Silver in Cylinders	20.	___	___
21.	Store Glass in Racks in Lowerators	21.	___	___
22.	Store China in China Cabinet or on Dish Shelf on the Line	22.	___	___

Instructor's Name ______________

Date ______________________

LESSON PLAN # 6

LESSON PLAN FORMAT

COURSE TITLE/NO. Food Service and Management

UNIT # I Machinery and Utensil Maintenance

(UNIT TITLE)

SCOPE OF UNIT:

The purpose of this unit is to train the tableware and cookware washer to clean, assemble, disassemble and operate a typical dish machine and three-compartment sink independently.

INFORMATION TOPIC # ____ OR DEMONSTRATION # 6

Close the Dish Machine Station

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper working conditions with 100% accuracy, close the dish machine station using each step of the procedure in sequential order.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Hobart Dish Machine Model AM 9T2

	(Name)	(Date)	Special Learning Features For:
Written By:	Hintz	6/1/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

REFERENCES: (BIBLIOGRAPHY DATA)

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The closing of the kitchen is the time when sanitation is most critical. If high standards are maintained at this time, conditions in the kitchen will not deteriorate.

LESSON PLAN # 6

COURSE TITLE/NO. Food Service and Management

UNIT # I — Machinery and Utensil Maintenance
(Unit or Block Title)

DEMONSTRATION # 6 (MANIPULATIVE OPERATIONS)

TITLE: Close the Dish Machine Station

STEPS OF PROCEDURE:

1. Turn Off Soap Dispenser
2. Turn Off Wash Water Heater
3. Drain Wash Tank
4. Remove Scrap Trays
5. Clean Scrap Trays
6. Close Access Doors
7. Depress Auxiliary Rinse Switch to Rinse Interior of Dish Machine
8. Turn Off Super Heater
9. Open Access Doors
10. Remove Lower Rinse Arm
11. Inspect for Clogged Rinse Nozzles
12. Remove Lower Rinse Arm Pivot
13. Remove Lower Wash Arm
14. Remove End Wash Nozzles
15. Flush Debris From Disassembled Wash Arm
16. Remove Upper Wash Arm
    Note: Retain Screw and Lower Arm From Machine
17. Remove End Wash Nozzles
18. Flush Debris From Disassembled Wash Arm
19. Remove (4) Upper Rinse Nozzles and Defusers
20. Pick Lime Deposits Out Of Defusers
21. Wipe the Interior of the Machine
22. Flush With Hot Water

LESSON PLAN # 6

COURSE TITLE/NO. Food Service and Management

UNIT # I **—** Machinery and Utensil Maintenance

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Student's Name ______________________

Close the Dish Machine Station

			Yes	No
1.	Turn Off Soap Dispenser	1.		
2.	Turn Off Wash Water Heater	2.		
3.	Drain Wash Tank	3.		
4.	Remove Scrap Trays	4.		
5.	Clean Scrap Trays	5.		
6.	Close Access Doors	6.		
7.	Depress Auxiliary Rinse Switch to Rinse Interior of Dish Machine	7.		
8.	Turn Off Super Heater	8.		
9.	Open Access Doors	9.		
10.	Remove Lower Rinse Arm	10.		
11.	Inspect for Clogged Rinse Nozzles	11.		
12.	Remove Lower Rinse Arm Pivot	12.		
13.	Remove Lower Wash Arm	13.		
14.	Remove End Wash Nozzles	14.		
15.	Flush Debris From Disassembled Wash Arm	15.		
16.	Remove Upper Wash Arm	16.		
17.	Remove End Wash Nozzles	17.		
18.	Flush Debris From Disassembled Wash Arm	18.		
19.	Remove (4) Upper Rinse Nozzles and Defusers	19.		
20.	Pick Lime Deposits Out of Defusers	20.		
21.	Wipe the Interior of the Machine	21.		
22.	Flush With Hot Water	22.		

Instructor's Name ______________

Date ______________________

JOB DESCRIPTIONS

WELDING

TITLE	DOT NUMBER	JOB DESCRIPTION
Shielded Metal Arc Welder (Arc Welder)	810.384-014	An arc welder joins together metal components of several shapes and sizes as specified by layout, blueprints, diagrams, work orders, welding procedures, or oral instruction, using electric arc welding equipment. The welder will obtain specified materials, then select electrode and insert it into the electrode holder, connect the cables from the welding unit, make adjustments to obtain amperage and voltage as specified. Start the power supply to produce electric current, strike arc which generates heat to melt and deposit metal from electrode to workpiece. Manually guides electrode along weld line, maintaining length of arc and speed of movement to form specified depth of fusion and bead, as judged from color of metal, sound of weld, and size of molten puddle. Make welds in the flat, horizontal, vertical and overhead positions. Examine weld for bead size and other specifications. May clean weld joint or workpiece using wire brush or portable grinder. May prepare broken or cracked parts and fill in holes. May chip off excess weld, slag, and spotter. May be required to pass performance tests to meet welding standards.
Oxy-Acetylene Welder (Gas Welder)	811.684-014	Welds metal parts, using gas welding equipment as specified by layout, welding diagram, or work order. Selects torch, torch tip, filler rod, and flux according to welding chart specifications or type or thickness of metal. Connects regulator valves and hoses to oxygen, fuel gas cylinders, and welding torch when necessary. Turns regulator valves to activate flow of gases, lights torch and adjusts gas mixture and pressure to obtain desired flame based on knowledge of gas-welding techniques.

		Holds torch at proper angle to metal and guides along weld joint, applying filler rod to molten area to form weld. Examines weld for bead size and other specifications. Layout, position, and tack weld workpieces. Weld in flat, horizontal, vertical, and overhead positions. May repair broken or cracked metal objects and fill holes. May clean or degrease parts using wire brush or portable grinder. Braze common joints as well as use the cutting torch to cut metal plate or structural shapes. May be required to pass performance tests to meet welding standards.
Gas Tungsten Arc Welder (Arc Welder)	810.382-010	A gas tungsten metal arc welder joins together metal parts of various shapes as specified by layout, blueprints, diagrams, work orders, welding procedures, or oral instruction using gas tungsten arc welding. Select, grind, and place tungsten in torch according to specifications or knowledge. Will turn knobs to set current and voltage and set flow meters and regulators to proper adjustments. Set material into position and tack weld where necessary, then make welds by moving torch by hand along weld joint in flat, horizontal, vertical and overhead positions. Some welds require the adding of a filler wire to the molten puddle. The welder will visually examine welds for adherence to specifications. May be required to pass performance test to meet welding standards.
Gas Metal Arc Welder (Arc Welder) (Gas Welder)	810.382-010 810.384-014	The gas metal arc welder joins together metal products as specified by layout blueprints, diagrams, welding procedures, or oral instruction using gas metal arc welding equipment. The welder will obtain specified materials, then select the wire electrode for the job. Thread specified electrode wire from reel through feed rolls and welding head, adjust shielding gas flow rate on flow meters or regulators. Turn knobs to set current, voltage, and synchronize feed of wire with speed of welding action. Guide welding gun in area where welding is to be done. Perform welds in the flat, horizontal, vertical, and overhead positions. May be required to pass performance tests to meet welding standards.

Working Conditions

Welders are exposed to more potential hazards than most other workers. The metals they use are often rusty or covered in grease and dirt. The edges of metal are often sharp and the material weight is often heavy. During the welding process, the intense light emitted contains ultraviolet and infrared rays which can be dangerous to face and skin if not protected by proper safety equipment and clothing. Protective clothing should be worn such as long sleeves, pants of flame resistant material, safety shoes, goggles, helmets with protective lenses, gloves, and other devices to prevent burns and eye injuries. Although lighting and ventilation usually are adequate, some metals give off toxic gases and fumes as they melt. The noise level in the shop area is usually at a very high decibel rating, and at times ear protection should be worn. Indoor welding shops are usually hot in the summer and cold in the winter. Outside welding depends on weather conditions. Welders, working in welding booths, often have long periods of isolation from other workers.

Salary Range

Average earnings for welders are: starting industrial welder, $4.00 - $5.50 an hour; experienced welders, $5.00 - $10.00 an hour; construction trade welders, $9.00 - $14.00 an hour.

TASK ANALYSIS

WELDING

1. Butt weld in flat position.
2. Tee weld in flat position.
3. Lap weld in flat position.
4. Outside corner weld in flat position.
5. Butt weld in horizontal position.
6. Lap weld in horizontal position.
7. Tee weld in horizontal position.
8. Outside corner weld in horizontal position.
9. Butt weld in vertical position.
10. Lap weld in vertical position.
11. Tee weld in vertical position.
12. Outside corner weld in vertical position.
13. Butt weld in overhead position.
14. Lap weld in overhead position.
15. Tee weld in overhead position.
16. Outside corner weld in overhead position.
17. Cut with oxy-acetylene cutting torch.
18. Braze common joints with oxy-acetylene torch.

TASK ANALYSIS

WELDING

OXY-ACETYLENE

1. Butt weld in flat position.
2. Tee weld in flat position.
3. Lap weld in flat position.
4. Outside corner weld in flat position.
5. Butt weld in horizontal position.
6. Lap weld in horizontal position.
7. Tee weld in horizontal position.
8. Outside corner weld in horizontal position.
9. Butt weld in vertical position.
10. Lap weld in vertical position.
11. Tee weld in vertical position.
12. Outside corner weld in vertical position.
13. Butt weld in overhead position.
14. Lap weld in overhead position.
15. Tee weld in overhead position.
16. Outside corner weld in overhead position.
17. Cut with oxy-acetylene cutting torch.
18. Braze common joints with oxy-acetylene torch.

SHIELDED METAL ARC

1. Butt weld in flat position.
2. Tee weld in flat position.
3. Lap weld in flat position.
4. Outside corner weld in flat position.
5. Butt weld in horizontal position.
6. Tee weld in horizontal position.
7. Lap weld in horizontal position.
8. Outside corner weld in horizontal position.
9. Butt weld in vertical position.
10. Tee weld in vertical position.
11. Lap weld in vertical position.
12. Outside corner weld in vertical position.
13. Butt weld in overhead position.
14. Tee weld in overhead position.
15. Lap weld in overhead position.
16. Outside corner weld in overhead position.

GAS TUNGSTEN ARC

1. Butt weld in flat position.
2. Lap weld in flat position.
3. Tee weld in flat position.
4. Outside corner weld in flat position.
5. Butt weld in horizontal position.
6. Lap weld in horizontal position.
7. Tee weld in horizontal position.
8. Outside corner weld in horizontal position.
9. Butt weld in vertical position.
10. Lap weld in vertical position.
11. Tee weld in vertical position.
12. Outside corner weld in vertical position.
13. Butt weld in overhead position.
14. Lap weld in overhead position.
15. Tee weld in overhead position.
16. Outside corner weld in overhead position.

GAS METAL ARC

1. Butt weld in flat position.
2. Lap weld in flat position.
3. Tee weld in flat position.
4. Outside corner weld in flat position.
5. Butt weld in horizontal position.
6. Lap weld in horizontal position.
7. Tee weld in horizontal position.
8. Outside corner weld in horizontal position.
9. Butt weld in vertical position.
10. Lap weld in vertical position.
11. Tee weld in vertical position.
12. Outside corner weld in vertical position.
13. Butt weld in overhead position.
14. Lap weld in overhead position.
15. Tee weld in overhead position.
16. Outside corner weld in overhead position.

INSTRUCTIONAL ANALYSIS

Course: Welding

Unit: Oxy-Acetylene Welding

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Development of Oxy-Acetylene Welding
	2. Oxy-Acetylene Welding and Cutting Equipment
	3. Set Up Oxy-Acetylene Welding Equipment
	4. Metal Identification and Selection of Filler Wire
	5. Safety
	6. Preparing to Make Welds in the Flat Position
7. Make Butt, Tee, Lap, and Outside Corner Welds in the Flat Position	
	8. Preparing to Make Welds in the Horizontal Position
9. Make Butt, Tee, Lap, and Outside Corner Welds in the Horizontal Position	
	10. Preparing to Make Welds in the Vertical Position
11. Make Butt, Tee, Lap, and Outside Corner Welds in the Vertical Position	
	12. Preparing to Make Welds in the Overhead Position

INSTRUCTIONAL ANALYSIS

Course: Welding

Unit: Oxy-Acetylene Welding (continued)

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
13. Make Butt, Tee, Lap, and Outside Corner Welds in the Overhead Position	
	14. Preparing to Make Cuts With Oxy-Acetylene Cutting Torch
15. Cutting With Oxy-Acetylene Cutting Torch	
	16. Preparing to Braze
17. Brazing Common Joints	

INSTRUCTIONAL ANALYSIS

Course: Welding

Unit: Shielded Metal Arc Welding

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. History and Development
	2. Arc Welding Equipment
	3. Electrode Selection
	4. Safety
	5. Metal Identification
	6. Preparing to Make Welds in the Flat Position
7. Make Butt, Tee, Lap, and Outside Corner Welds in the Flat Position	
	8. Preparing to Make Welds in the Horizontal Position
9. Make Butt, Tee, Lap, and Outside Corner Welds in the Horizontal Position	
	10. Preparing to Make Welds in the Vertical Position
11. Make Butt, Tee, Lap, and Outside Corner Welds in the Vertical Position	
	12. Preparing to Make Welds in the Overhead Position
13. Make Butt, Tee, Lap, and Outside Corner Welds in the Overhead Position	

INSTRUCTIONAL ANALYSIS

Course: Welding

Unit: Gas Tungsten Arc Welding

Skills: What the Student Must Be Able To Do	**Related Information**: What the Student Must Know
	1. Development and Industrial Applications
	2. Gas Tungsten Arc Welding Equipment
	3. Types of Filler Wire for Various Types of Metal
	4. Safety
	5. Set Up Gas Tungsten Arc Welding Equipment
	6. Preparing to Make Welds in the Flat Position
7. Make Butt, Tee, Lap, and Outside Corner Welds in the Flat Position	
	8. Preparing to Make Welds in the Horizontal Position
9. Make Butt, Tee, Lap, and Outside Corner Welds in the Horizontal Position	
	10. Preparing to Make Welds in the Vertical Position
11. Make Butt, Tee, Lap, and Outside Corner Welds in the Vertical Position	

INSTRUCTIONAL ANALYSIS

Course: Welding

Unit: Gas Tungsten Arc Welding (continued)

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	12. Preparing to Make Welds in the Overhead Position
13. Make Butt, Tee, Lap, and Outside Corner Welds in the Overhead Position	

INSTRUCTIONAL ANALYSIS

Course: Welding

Unit: Gas Metal Arc Welding

Skills: What the Student Must Be Able To Do	Related Information: What the Student Must Know
	1. Gas Metal Arc Process and Industrial Application
	2. Gas Metal Arc Equipment
	3. Types of Metal Transfer
	4. Types of Wire Shielding Gas
	5. Safety
	6. Preparing to Make Welds in the Flat Position
7. Make Butt, Tee, Lap, and Outside Corner Welds in the Flat Position	
	8. Preparing to Make Welds in the Horizontal Position
9. Make Butt, Tee, Lap, and Outside Corner Welds in the Horizontal Position	
	10. Preparing to Make Welds in the Vertical Position
11. Make Butt, Tee, Lap, and Outside Corner Welds in the Vertical Position	
	12. Preparing to Make Welds in the Overhead Position
13. Make Butt, Tee, Lap, and Outside Corner Welds in the Overhead Position	

LESSON PLAN # 1

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 1 OR DEMONSTRATION # ____

History and Development of Arc Welding

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

With 80% accuracy given the proper classroom conditions:

1. Explain history of arc welding.
2. Describe uses of arc welding.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Chalkboard

Handout-"History and Development of Arc Welding"

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	2/10/82	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Handout-"History and Development of Arc Welding"

REFERENCES: (BIBLIOGRAPHY DATA)

Althouse and Turnquist. Modern Welding Practices. South Holland, IL: Goodheart-Wilcox, 1958.

Giachino and Weeks. Welding Skills and Practices, 5th edition. Chicago, IL: American Technical Society, 1976.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Welding has been used for hundreds of years, but not as we know of it today. Years ago forge welding was used by the blacksmith in his metal-joining process. In the 1800's electric arc was discovered but it wasn't until 1925 that coated electrodes were made available. Today arc welding is widely used in most metal-working industries as well as maintenance or repair jobs.

LESSON PLAN # 1

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 1 (Technical - General - Guidance)

TITLE: History and Development of Arc Welding

OUTLINE:

I History and Development

- A. Discovery of the Electric Arc
- B. Discovery and Use of Bare Electrodes (Interaction Item # 1)
- C. Discovery and Use of Coated Electrodes
- D. Development of Welding During Wars
- E. Development of Automatic Weld Machines (Interaction Item # 2)

II Applications of Arc Welding

- A. Product Fabrication
- B. Maintenance
- C. Salvaging Materials
- D. Tools, Fixtures
- E. Building and Construction
- F. Custom Welding (Interaction Item # 3)

III Major Industries Using Arc Welding

Manufacturing Industries

1. Auto
2. Aircraft
3. Bridge
4. Boiler and Tank
5. Building and Construction
6. Railroad

IV Summary and Closure

A. History and Development

B. Application of Arc Welding

C. Major Industries Using Arc Welding

D. From the time of forge welding to the use of the controlled electric arc, welding has come a long way. The change over from bare electrode to coated electrodes has brought about stronger and smoother welds in the areas of industrial applications and repairs.

LESSON PLAN # 1

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 1 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What was one of the first kinds of welding?

2. When was the covered electrode developed?

3. What are some major applications of arc weld?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Instructor-led class discussion on industries using arc welding.

LESSON PLAN # 1

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding

(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Directions: Read the questions and list your response accordingly.

1. What was the first type of welding?

2. When did the bare electrodes come into use?

3. List five places arc welding is used for production purposes.

   a) ____________________

   b) ____________________

   c) ____________________

   d) ____________________

   e) ____________________

LESSON PLAN # 2

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 2 OR DEMONSTRATION #

Arc Welding Equipment

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Describe the types of arc welding equipment.
2. Explain set-up of arc welding equipment.
3. List protective equipment.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Chalkboard

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	2/11/82	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, 5th edition. Chicago, IL: American Technical Society, 1976. Pages 55-69.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Working in industry, it will be important for you as a worker to be familiar with arc welding equipment so a proper set-up can be made. A good welder will have knowledge of machines and their set-up.

LESSON PLAN # 2

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 2 (Technical - General - Guidance)

TITLE: Arc Welding Equipment

OUTLINE:

I Welding Machines

A. AC Welding Machines

B. DC Welding Machines
(Interaction Item # 1)

II Machine Parts

A. Machine and Power Inlet

B. Electrode Holder

C. Ground and Clamp
(Interaction Item # 2)

III Protective Equipment

A. Helmets

B. Goggles

C. Gloves

D. Apron and Sleeves
(Interaction Item # 3)

IV Summary and Closure

A. Welding Machines

B. Machine Parts

C. Protective Equipment

D. Keep in mind there are two basic types of welding machines. It is very important to know the parts of the welder, so a correct set-up can be made at a prescribed time. It is likewise important to know the types of protective equipment available for the welding person to use.

LESSON PLAN # 2

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 2 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Name two advantages of AC welders.
2. Describe the methods of connecting a ground.
3. Why is protective equipment important?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Look at the machines in the shop and discuss the set-up.

LESSON PLAN # 2

COURSE TITLE/NO. Welding

UNIT # 1 **—** Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Read the questions and list your response accordingly.

1. List the two major types of welding machines.

   a) ____________________

   b) ____________________

2. Explain the difference of AC and DC type welding machines.

   ____

   ____

   ____

3. List three items of protective equipment that should be worn while arc welding.

   a) ____________________

   b) ____________________

   c) ____________________

4. List the steps involved in setting up an arc welding machine.

   ____

   ____

   ____

   ____

LESSON PLAN # 3

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding
(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 3 OR DEMONSTRATION #

Electrode Selection

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. Identify electrodes by the A.W.S. and A.S.T.M. classification system.
2. Describe the functions of the electrode coating in the welding process.
3. Select the correct electrode for a specified welding job.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Film: Arc Welding Electrode Selection (Southwest Missouri State University)

Chalkboard

Three welding rods: #6010, #7014, #7018

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	2/11/82	Individual or Small
			Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, 5th edition. Chicago, IL: American Technical Society, 1976. Pages 70-81.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Many different types and kinds of electrodes are made for welding purposes. These electrodes are classified into five main groups: 1) mild steel, 2) high carbon steel, 3) special alloy steel, 4) cast iron and 5) non ferrous. The mild steel electrode is the most used. It is extremely important that the welder be able to select the proper electrode for the job. In this lesson we will cover factors to consider in selecting the correct electrode for the job.

LESSON PLAN # 3

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 3 (Technical - General - Guidance)

TITLE: Electrode Selection

OUTLINE:

I Kinds of Electrodes

A. Coated Metallic Electrodes

1. Coatings
2. Functions of Coatings
3. Electrode Sizes
4. Metallic Compositions

B. Carbon Electrodes

C. Special Electrodes
(Interaction Item # 1)

II Identifying Electrodes

A. A.W.S. Classification System
(Interaction Item # 2)

B. N.E.M.A. Coding System
(Interaction Item # 3)

III Selecting Correct Electrodes

A. Properties of Base Metal

B. Electrode Diameter

C. Joint Design and Fit-Up

D. Welding Position

E. Welding Current

IV Electrode Care

  A. Conserving Electrodes

  B. Storing Electrodes

V Summary and Closure

  A. Kinds of Electrodes

  B. Identifying Electrodes

  C. Selecting Correct Electrodes

  D. Electrode Care

  E. It is important to know the kinds of electrodes and their proper uses. To be able to identify the electrodes will better help you, the welder, in obtaining the correct electrode for the job. There will be times when you will be expected to select the correct electrode from knowledge you have about the weld joint.

LESSON PLAN # 3

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 3 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Why is it necessary to know electrode identification and classification?
2. Who established the electrode classification system?
3. What are the functions of electrode coatings?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. View motion picture.
2. Identify electrodes from the shop.
3. Measure electrode size.

LESSON PLAN # 3

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Read the questions and list your response accordingly.

1. Describe the functions of numbers on welding electrodes.

2. Describe four functions of the electrode coating in the welding process.

3. List three factors one must consider in selecting an electrode for a welding job.

LESSON PLAN # 4

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 4 OR DEMONSTRATION # ______

Safety

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. List the hazards of arc welding.
2. Explain how hazards can be avoided through safe work practices.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Chalkboard

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	3/8/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, 5th edition. Chicago, IL: American Technical Society, 1976. Pages 9-18.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Safety should be a matter of concern to everyone, especially the welding operator. Arc welding is accompanied with some potential hazards which can result in injury to persons who do not follow safe practices. Most welding accidents can be prevented if proper precautions are taken. Perhaps the most important factor in safety is a thorough understanding of what is involved in safe welding practices.

LESSON PLAN # 4

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 4 (Technical - General - Guidance)

TITLE: Safety

OUTLINE:

- I Arc Welding Safety Hazards
  - A. Electric Shock
  - B. Arc Burn
  - C. Eye Flash
  - D. Fire and Burns
  - E. Toxic Vapors and Fumes
  - F. Infared and Ultraviolet Rays
  - G. Noise

  (Interaction Item # 1)
- II Safety Precautions
  - A. Ventilation
  - B. Protective Clothing and Equipment
  - C. Eye Protection
  - D. Fire Protection
  - E. Care of Equipment

  (Interaction Item # 2)
- III Shop Hazards
  - A. Sharp Metal
  - B. Hot Metal
  - C. Heavy Metal

- D. Moving Machinery
- E. Sparks From Grinders

  (Interaction Item # 3)

IV Summary and Closure

- A. Arc Welding Safety Hazards
- B. Safety Precautions
- C. Shop Hazards
- D. In a welding shop, you will find several safety hazards. You will encounter hazards from rays, heat, noise, sharp objects and fumes to name only a few. By using the safety precautions you learn in class, it may prevent you from being hurt or even killed.

LESSON PLAN # 4

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 4 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. How can the welder prevent electrical shock?

2. How can arc burn be prevented?

3. How should a person lift heavy metal?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Instructor-led discussion on arc welding safety.

LESSON PLAN # 4

COURSE TITLE/NO. Welding

UNIT # 1 **—** Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Read the questions and list your response accordingly.

1. At what distance will ultraviolet and infared rays be dangerous? ____________________

2. Why is it necessary to have proper ventilation in a welding area? ____________________

   ____

3. List six hazards that might be found in a welding shop with poor conditions.

   a) ____________________

   b) ____________________

   c) ____________________

   d) ____________________

   e) ____________________

   f) ____________________

4. To prevent objects from entering the eyes a person should wear __________ to cover the face and/or eyes.

LESSON PLAN # 5

LESSON PLAN FORMAT

COURSE TITLE/ÑO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 5 OR DEMONSTRATION #

Metal Identification

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

1. List the categories to which metals are divided.
2. List common ferrous and non ferrous metals.
3. List alloys found in ferrous metals.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Chalkboard

Sample metals

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	3/8/82	Individual or Small
Instructional Delivery System By:			Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, 5th edition. Chicago, IL: American Technical Society, 1976. Pages 19-41 and 150-160.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

Althouse, Turnquist and Bodwitch. Modern Welding Practices. South Holland, IL: Goodheart-Willcox Co., Inc., 1958. Pages 24-1 to 24-25.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

As a welder you will work with many different types of metals. It is necessary for the welder to be able to recognize these metals by appearance and classification number. In industry, a person that can distinguish the difference in metals is normally paid a higher wage.

LESSON PLAN # 5

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 5 (Technical - General - Guidance)

TITLE: Metal Identification

OUTLINE:

I Ferrous Metals

A. Carbon Steels

1. Low Carbon
2. Mild Steel
   (Interaction Item # 2)
3. Medium Carbon
4. High Carbon
   (Interaction Item # 3)

B. Conditions of Steel

1. Hot Rolled
2. Cold Rolled
3. Cold Drawn
4. Cast Steel
5. Forged
   (Interaction Item # 1)

C. Alloy Steel

1. Chromium Steel
2. Nickel Steel
3. High Chromium or Stainless
4. Chrome-Nickel Steel
5. Manganese Steel
6. Molybdenum Steel
7. Tungsten Steel
8. Vandium Steel
9. High Speed Steel
10. Stellite Steel

D. Classification of Iron

1. Wrought Iron
2. Gray Cast Iron
3. White Cast Iron
4. Malleable Cast Iron

II Steel Designating Systems

A. American Iron and Steel Institute (AISI) Numbering System

B. Society of Automotive Engineers (SAE) Numbering System

(Interaction Item #4)

III Non-Ferrous Metals

A. Aluminum
B. Copper
C. Brass
D. Bronze
E. Magnesium
F. Zinc
G. Lead
H. Tin
I. Babbitt
J. Pewter
K. Nickel
L. Titanium
M. Lithium
N. Zircronium
O. Barylium
P. Silver
Q. Gold

IV Steel Shapes

A. Shapes From Slabs

B. Shapes From Blooms

C. Shapes From Billets
(Interaction Item # 5)

V Summary and Closure

A. Ferrous Metals

B. Steel Designating Systems

C. Non-Ferrous Metals

D. Steel Shapes

E. When deciding the type of metal to use, one must first be able to identify the material. The ferrous metals are most commonly called steel and the metals containing no iron are called non-ferrous metals. Metals have a designation system and come in several different shapes.

LESSON PLAN # 5

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 5 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. How is steel formed into shapes for industrial use?
2. What effect does carbon content have on steel?
3. What are the basic ingredients of carbon steel?
4. How are carbon steels classified?
5. What are some of the structural shapes found in welding areas?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Walk through the shop and identify metal found in the metal rack.

LESSON PLAN # 5

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Read the questions and list your response accordingly.

1. List the two main categories into which metals are divided.

a) ______________________

b) ______________________

2. List four alloys found in ferrous metals.

a) ______________________

b) ______________________

c) ______________________

d) ______________________

3. List two types of non-ferrous metals found in industry.

a) ______________________

b) ______________________

4. List two types of ferrous metals found in industry.

a) ______________________

b) ______________________

LESSON PLAN # 6

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding
(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 6 OR DEMONSTRATION #

Preparing to Make Welds in the Flat Position

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

Explain:
1) When current should be adjusted.
2) Polarity.
3) How to strike an arc.
4) Arc length.
5) Rod angle.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Chalkboard

Welding machine

Electrodes

	(Name)	(Date)	Special Learning Features For:
Written By	Goetz	3/23/82	Individual or Small
Instructional Delivery System By:			Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, 5th edition. Chicago, IL: American Technical Society, 1976. Pages 87-108.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

To be a good welder you will find it necessary to know the correct current settings, as well as having an arc length and travel speed that is suitable for the welding taking place. During this lesson I will present this information to you.

LESSON PLAN # 6

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 6 (Technical - General - Guidance)

TITLE: Preparing to Make Welds in the Flat Position

OUTLINE:

I Arc Welding Variables

- A. Current Setting
    - 1. A.C. Current
    - 2. D.C. Current
        - a. Straight Polarity
        - b. Reverse Polarity

(Interaction Item # 1)

- B. Arc Length
    - 1. Adjusting for Correct Arc Length

(Interaction Item # 2)

- C. Welding Speed
    - 1. Downward Direction
    - 2. Forward Direction
- D. Weld Joints
    - 1. Butt
    - 2. Tee
    - 3. Lap
    - 4. Outside Corner
- E. Welding Position and Angle of Electrode
    - 1. Correct Welding Position
    - 2. Rod Angle from End
    - 3. Rod Angle from Side

(Interaction Item # 3)

II Methods of Striking an Arc

  A. Scratching

  B. Tapping

III Summary and Closure

  A. Arc Welding Variables

  B. Method of Striking an Arc

  C. In arc welding a person will find that there are several variables that can change the end result of a weld. A few of these variables are current setting, arc length, welding speed, the way the material is fit up, and the angle in which you hold the electrode. Even the way you strike an arc will enter in to how your weld bead will turn out, so as you will find out, welding is an art and it will take a lot of repetitious practice.

LESSON PLAN # 6

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 6 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is the difference in straight and reverse polarity?

2. What do we do if our electrode sticks to our metal during welding?

3. Why is rod angle important?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Walk through the shop and show the machines.

LESSON PLAN # 6

COURSE TITLE/NO. Welding

UNIT # 1 **—** Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Read the questions and list your response accordingly.

1. When should the current be adjusted on a welding machine?

   ____

2. List two methods of striking an arc:

   a) ______________________________

   b) ______________________________

3. How long should an arc length be? ______________

   ____

4. How can you tell when an arc length is correct?

   ____

   ____

5. What is meant by polarity? ______________

   ____

6. Describe rod angle: ______________

   ____

   ____

LESSON PLAN # 7

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT: In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # ________ OR DEMONSTRATION # 7

Make Butt, Tee, Lap, and
Outside Corner Welds in the Flat Position

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

With 100% accuracy given the proper shop conditions, make the following welds in the flat position:

1. Butt
2. Lap
3. Tee
4. Outside Corner

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Welding Machine with Leads
¼" x 1" x 6" Hot Rolled Steel
Welding Electrodes 1/8" E6013

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	6/1/82	Individual or Small
Instructional Delivery System By:			Group Instruction

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, 5th edition. Chicago, IL: American Technical Society, 1976. Pages 87-108.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Welding can be done in any position but the most economical and efficient way is in the flat position. When welds are made in this position, the molten metal has less tendency to run, welding speed is increased, welding is less fatiguing, and better penetration can be secured.

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # ________ (MANIPULATIVE OPERATIONS)

TITLE: Butt Joint in Flat Position

STEPS OF PROCEDURE:

1. Set polarity: D C Straight.
2. Set welding current: 80 - 120 amps.
3. Turn on welding machine.
4. Position plates on a grounded metal table laying flat and edges together.
5. Tack weld plates together at each end of the plates.
6. Strike arc at one end, hold the electrode at about 10 degrees in the direction of travel, and weld bead full length of joint.

   Note: Be careful to keep the center of the weld bead on the center of the joint. -
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION #________(MANIPULATIVE OPERATIONS)

TITLE: Lap Joint in Flat Position

STEPS OF PROCEDURE:

1. Set polarity: D C Straight.
2. Set welding current: 80 - 120 amps.
3. Turn on welding machine.
4. Position plates on a grounded metal table laying flat and lapped halfway on each other.
5. Tack weld plates together at each end of the plates.
6. Strike arc at one end, hold the electrode up 45 degrees, tilt the electrode about 20 degrees in the direction of travel, and weld full length of joint.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # ______ (MANIPULATIVE OPERATIONS)

TITLE: Tee Joint in Flat Position

STEPS OF PROCEDURE:

1. Set polarity: D C Straight.
2. Set welding current: 80 - 120 amps.
3. Turn on welding machine.
4. Position plates on a grounded metal table by setting one plate vertical in the middle of the horizontal plate.
5. Tack weld plates together at each end of plates.
6. Strike arc at one end, hold the electrode up 45 degrees, tilt the electrode about 20 degrees in the direction of travel, and weld full length of joint.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION #__________ (MANIPULATIVE OPERATIONS)

TITLE: Outside Corner Joint in Flat Position

STEPS OF PROCEDURE:

1. Set polarity: D C Straight.
2. Set welding current: 70 - 100 amps.
3. Turn on machine.
4. Position plates on a grounded metal table with edges together and surfaces at right angles with each other.
5. Tack weld plates together at each end of plates.
6. Strike arc at one end, hold electrode vertically, tilt electrode 15 to 20 degrees in the direction of travel, and weld full length of the joint.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Student Name ______________________

Date ______________________

Butt Joint in Flat Position

		Yes	No
1. Set polarity: D C Straight.	1.	___	___
2. Set welding current: 80 - 120 amps.	2.	___	___
3. Turn on welding machine.	3.	___	___
4. Position plates on a grounded metal table laying flat and edges together.	4.	___	___
5. Tack weld plates together at each end of the plates.	5.	___	___
6. Strike arc at one end, hold the electrode at about 10 degrees in the direction of travel, and weld bead full length of joint.	6.	___	___
7. Chip off slag and wire brush the weld.	7.	___	___
8. Inspect your weld for uniformity and quality.	8.	___	___

Instructor Name ______________

Date ______________________

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Student Name ____________________

Date ____________________

Lap Joint in Flat Position

		Yes	No
1. Set polarity: D C Straight.	1.	___	___
2. Set welding current: 80 - 120 amps.	2.	___	___
3. Turn on welding machine.	3.	___	___
4. Position plates on a grounded metal table laying flat and lapped halfway on each other.	4.	___	___
5. Tack weld plates together at each end of the plates.	5.	___	___
6. Strike arc at one end, hold the electrode up 45 degrees, tilt the electrode about 20 degrees in the direction of travel, and weld full length of joint.	6.	___	___
7. Chip off slag and wire brush the weld.	7.	___	___
8. Inspect your weld for uniformity and quality.	8.	___	___

Instructor Name ____________________

Date ____________________

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Student Name ____________________

Date ____________________

Tee Joint in Flat Position

		Yes	No
1. Set polarity: D C Straight.	1.	____	____
2. Set welding current: 80 - 120 amps.	2.	____	____
3. Turn on welding machine.	3.	____	____
4. Position plates on a grounded metal table by setting one plate vertical in the middle of the horizontal plate.	4.	____	____
5. Tack weld plates together at each end of plates.	5.	____	____
6. Strike arc at one end, hold the electrode up 45 degrees, tilt the electrode about 20 degrees in the direction of travel, and weld full length of joint.	6.	____	____
7. Chip off slag and wire brush the weld.	7.	____	____
8. Inspect your weld for uniformity and quality.	8.	____	____

Instructor Name ____________________

Date ____________________

LESSON PLAN # 7

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Student Name ______________________

Date ______________________

Outside Corner Joint in Flat Position

			Yes	No
1.	Set polarity: D C Straight.	1.	___	___
2.	Set welding current: 70 - 100 amps.	2.	___	___
3.	Turn on machine.	3.	___	___
4.	Position plates on a grounded metal table with edges together and surfaces at right angles with each other.	4.	___	___
5.	Tack weld plates together at each end of plates.	5.	___	___
6.	Strike arc at one end, hold electrode vertically, tilt electrode 15 to 20 degrees in the direction of travel, and weld full length of the joint.	6.	___	___
7.	Chip off slag and wire brush the weld.	7.	___	___
8.	Inspect your weld for uniformity and quality.	8.	___	___

Instructor Name ------------------
Date ______________________

LESSON PLAN # 8

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 8 OR DEMONSTRATION # ______

Preparing to Make Welds in the Horizontal Position

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

Explain:

1. Welding current adjustment.
2. Polarity.
3. Travel speed.
4. Arc length.
5. Rod angle.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Chalkboard
Welding machine
Electrodes

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	6/25/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, Fifth edition.
Chicago, IL: American Technical Society, 1976. Pages 109-113.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

Welding Electrode Pocket Guide. Murray Hill, NJ: AIRCO
Welding Products, 1982.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

As buildings are built, equipment constructed, and products produced; the ideal welding procedure is done in the flat position. But often times a welder will find it necessary to perform welds other than in the flat position. Other positions such as horizontal, vertical and overhead can be used. In this lesson we will discuss techniques that will help you to perform tasks when welding in the horizontal position.

LESSON PLAN # 8

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 8 (Technical - General - Guidance)

TITLE: Preparing to Make Welds in the Horizontal Position

OUTLINE:

I Arc Welding Variables

A. Current Setting

1. A.C. current
2. D.C. current
   a. Straight polarity
   b. Reverse polarity

Interaction Item # 1

B. Arc Length

1. Adjusting for correct arc length

Interaction Item # 2

C. Welding Speed

1. Downward direction
2. Forward direction

D. Weld Joints

1. Butt
2. Tee
3. Lap
4. Outside corner

E. Welding Position and Angle of Electrode

1. Correct welding position
2. Rod angle from end
3. Rod angle from side

Interaction Item # 3

II Summary and Conclusion

A. Arc Welding Variables

B. While welding in the horizontal position, remember the welding current adjustments needed to operate the electrode. Watch for correct arc length and travel speed while welding on various weld joints. The electrode angle will also affect the weld bead appearance and should be held at the proper angle.

LESSON PLAN # 8

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 8 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

Preparing To Make Weld. n The Horizontal Position

1. Why should you want to use A.C. current over D.C. current?

2. Why is travel speed important?

3. Describe the angle of the electrode while welding in the horizontal position.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Class discussion on preparing to make welds in the horizontal position.

LESSON PLAN # 8

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Preparing to Make Welds in the Horizontal Position

Directions: Read the questions and list your response accordingly.

1. What type of current should be used in horizontal welding?
____

2. What polarities are used in horizontal welding? __________
____

3. Will a person travel faster or slower in horizontal welding?
____

4. The arc length should be shorter or longer when you weld in the horizontal position? ______________

5. What is the desired rod angle for horizontal welding?
____

LESSON PLAN # 9

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # ______ OR DEMONSTRATION # 9

Make Butt, Lap, Tee, & Outside Corner Welds in the Horizontal Position

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper shop conditions with 100% accuracy:

Make the following welds in the horizontal position:

1. Butt
2. Lap
3. Tee
4. Outside corner

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Welding machine with leads
Welding electrodes
¼" x 1" x 6" hot rolled steel
Welding electrodes 1/8" E6010
E7018

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	6/17/82	Individual or Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, Fifth Edition. Chicago, IL: American Technical Society, 1976. Pages 109-113.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

Welding Electrode Pocket Guide. Murray Hill, NJ: AIRCO Welding Products, 1982.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

It is not always possible to weld pieces in the flat position. Occasionally, the welding operation must be done while the work is in the horizontal position. A horizontal position weld is made when the material is on a vertical plane and the line of weld runs on a line with the horizon. Welding in the horizontal position requires a little different procedure than welding in the flat position.

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 9 (MANIPULATIVE OPERATIONS)

TITLE: Butt Joint in the Horizontal Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates on a grounded welding table in the horizontal position with the edges together.
5. Tack weld the plates together at each end of the plates.
6. Strike arc at one end holding the electrode about 5 to 10 degrees below perpendicular, inclined about 10 to 15 degrees in the direction of travel, and weld full length of the joint.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 9 **(MANIPULATIVE OPERATIONS)**

TITLE: Lap Joint in the Horizontal Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates on a grounded welding table in the horizontal position and lapped half way on each other.
5. Tack weld plates together at each end of the plates.
6. Strike the arc at one end, hold the electrode at a 45 degree angle to the horizontal plate, tilt the electrode about 20 to 30 degrees in the direction of travel, and weld full length of weld.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 **—** Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 9 **(MANIPULATIVE OPERATIONS)**

TITLE: Tee Joint in the Horizontal Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates on a grounded table in the horizontal position and setting the edge of one plate in the center of the other plate.
5. Tack weld plates together at each end of the plates.
6. Strike arc at one end, hold the electrode at 45 degree angle from plate surfaces, tilt the electrode about 20 degrees in the direction of travel, and weld full length of the joint.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 9 **(MANIPULATIVE OPERATIONS)**

TITLE: Outside Corner Joint in the Horizontal Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates on a grounded welding table in the horizontal position with the corners touching together and surfaces at right angles with each other.
5. Tack weld plates together at each end of plates.
6. Strike the arc at one end, hold the electrode about 10 degrees below the horizontal level, tilt in the direction of travel about 10 to 15 degrees, and weld full length of the joint.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Butt Joint in the Horizontal Position

Student's Name ____________________

	Yes	No
1. Set polarity: D.C. reverse.	___	___
2. Set welding current: 80-120 amps.	___	___
3. Turn on welding machine.	___	___
4. Position plates on a grounded welding table in the horizontal position with the edges together.	___	___
5. Tack weld the plates together at each end of the plates.	___	___
6. Strike arc at one end holding the electrode about 5 to 10 degrees below perpendicular, inclined about 10 to 15 degrees in the direction of travel, and weld full length of the joint.	___	___
7. Chip off slag and wire brush the weld.	___	___
8. Inspect your weld for uniformity and quality.	___	___

Instructor's Name ____________________

Date ________________________________

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Lap Joint in the Horizontal Position

Student's Name ____________________

	Yes	No
1. Set polarity: D.C. reverse.	___	___
2. Set welding current: 80-120 amps.	___	___
3. Turn on welding machine.	___	___
4. Position plates on a grounded welding table in the horizontal position and lapped half way on each other.	___	___
5. Tack weld plates together at each end of the plates.	___	___
6. Strike arc at one end, hold the electrode at a 45 degree angle to the horizontal plate, tilt the electrode about 20 to 30 degrees in the direction of travel, and weld full length of weld.	___	___
7. Chip off slag and wire brush the weld.	___	___
8. Inspect your weld for uniformity and quality.	___	___

Instructor's Name ____________________

Date ________________________________

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Tee Joint in the Horizontal Position

Student's Name ______________

	Yes	No
1. Set polarity: D.C. reverse.	___	___
2. Set welding current: 80-120 amps.	___	___
3. Turn on welding machine.	___	___
4. Position plates on a grounded table in the horizontal position and setting the edge of one plate in the center of the other plate.	___	___
5. Tack weld plates together at each end of the plates.	___	___
6. Strike arc at one end, hold the electrode at 45 degree angle from plate surfaces, tilt the electrode about 20 degrees in the direction of travel, and weld full length of the joint.	___	___
7. Chip off slag and wire brush the weld.	___	___
8. Inspect your weld for uniformity and quality.	___	___

Instructor's Name ______________

Date ______________

LESSON PLAN # 9

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Outside Corner Joint in the Horizontal Position

Student's Name ____________________

	Yes	No
1. Set polarity: D.C. reverse.	____	____
2. Set welding current: 80-120 amps.	____	____
3. Turn on welding machine.	____	____
4. Position plates on a grounded welding table in the horizontal position with the corners touching together and surfaces at right angles with each other.	____	____
5. Tack weld plates together at each end of plates.	____	____
6. Strike the arc at one end, hold the electrode about 10 degrees below the horizontal level, tilt in the direction of travel about 10 to 15 degrees, and weld full length of the joint.	____	____
7. Chip off slag and wire brush the weld.	____	____
8. Inspect your weld for uniformity and quality.	____	____

Instructor's Name ____________________

Date ________________________________

LESSON PLAN # 10

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding
(UNIT TITLE)

SCOPE OF UNIT: In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # 10 OR DEMONSTRATION # ____

Preparing To Make Welds in the Vertical Position
LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 80% accuracy:

Identify:

1. Welding current adjustment
2. Polarity
3. Travel speed
4. Arc length
5. Rod angle

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Welding machine
Welding electrodes
Chalkboard

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	5/17/82	Individual/ Small Group Instruction
Instructional Delivery System By:	404		

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, Fifth edition.
Chicago, IL: American Technical Society, 1976.
Pages 114-124.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

Welding Electrode Pocket Guide. Murray Hill, NJ: AIRCO
Welding Products, 1982.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In the fabrication of many structures such as steel buildings, bridges, tanks, pipelines, ships, and machinery; the operator must frequently make vertical welds. A vertical weld is one with a seam or line of weld running up or down. Most of the information you have learned in flat and horizontal welding can be utilized in vertical welding.

LESSON PLAN # 10

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

INFORMATION TOPIC # 10 (Technical - General - Guidance)

TITLE: Preparing to Make Welds in the Vertical Position

OUTLINE:

I Arc Welding Variables

A. Current Setting

1. A.C. current
2. D.C. current
    a. Straight polarity
    b. Reverse polarity

Interaction Item # 1

B. Arc Length

1. Adjusting for correct arc length

Interaction Item # 2

C. Welding Speed

1. Downward direction
2. Forward direction

D. Weld Joints

1. Butt
2. Tee
3. Lap
4. Outside Corner

E. Welding Position and Angle of Electrode

1. Correct welding position
2. Rod angle from end
3. Rod angle from side

Interaction Item # 3

II Summary and Conclusion

A. Arc Welding Variables

B. Vertical welding is somewhat more difficult than flat welding because of the gravitational effect on the weld puddle and the molten slag; therefore, it will be important to have the correct current setting. Use the correct polarity, travel the correct speed with the electrode that you use, and keep your arc length and rod angle correct. By doing this you will be able to master another welding position which will put you one more step closer to what employers are looking for.

LESSON PLAN # 10

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit Title)

INFORMATION TOPIC # 10 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

Preparing to Make Welds in the Vertical Position

1. Why would you use one polarity over another in vertical welding?

2. What length of arc should be maintained when welding in the vertical position?

3. How is the rod angle different for vertical than it is for horizontal?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Go through the shop and look at and discuss welds that have been made in the vertical position.

LESSON PLAN # 10

COURSE TITLE/NO. Welding

UNIT # 1 **—** Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Preparing to Make Welds in the Vertical Position

Directions: Identify each of the following statements as either true or false.

_____ 1. The welding current should be lower for welding a vertical up than it is for welding a flat weld with the same rod.

_____ 2. A person should use A.C. reverse when welding vertical up.

_____ 3. When welding vertical down, the travel speed will usually be faster than vertical up.

_____ 4. The arc length will usually be five times the electrode diameter.

_____ 5. Whe welding in the vertical up position, the rod angle should be in the dragging position.

LESSON PLAN # 11

LESSON PLAN FORMAT

COURSE TITLE/NO. Welding

UNIT # 1 Shielded Metal Arc Welding

(UNIT TITLE)

SCOPE OF UNIT:

In this unit students will learn principles, equipment, materials, technical information, skills and applications of arc welding.

INFORMATION TOPIC # ______ OR DEMONSTRATION # 11

Make Butt, Tee, Lap, & Outside Corner Welds in the Vertical Position

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper shop conditions make the following welds in the vertical position with 100% accuracy:

1. Butt
2. Lap
3. Tee
4. Outside corner

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Welding machine with leads
1/4" x 1" x 6" hot rolled steel
Welding electrodes 1/8" - 6013, 7018, 7014, 6010, 6011

	(Name)	(Date)	Special Learning Features For:
Written By:	Goetz	5/17/82	Individual or
			Small Group Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Giachino and Weeks. Welding Skills and Practices, Fifth edition.
Chicago, IL: American Technical Society, 1976.
Pages 114-124.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

Welding Electrode Pocket Guide. Murray Hill, NJ: AIRCO
Welding Products, 1982.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Being able to weld in the vertical position will make it possible for you, the welder, to obtain some jobs easier and often times earn more pay. The equipment will usually be the same that you used in the other positions and the information you have learned in welding flat and horizontal welds will be useful as you weld in the vertical position.

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 11 (MANIPULATIVE OPERATIONS)

TITLE: Butt Joint in the Vertical Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates in the vertical position on a grounded metal table with the edges together.
5. Tack weld plates together at each end of the plates.
6. Strike arc at one end, hold the electrode about 10 to 15 degrees for vertical up welding or 15 to 30 degrees for vertical down welding, and weld bead full length of joint.

   Note: Push the electrode for vertical up welding.
   Drag the electrode for vertical down welding.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 11 (MANIPULATIVE OPERATIONS)

TITLE: Tee Joint in the Vertical Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates in the vertical position on a grounded metal table by setting the edge of one plate in the center of the other plate's surface.
5. Tack weld plates together at each end of plates.
6. Strike arc at one end, hold the electrode about 10 to 15 degrees for vertical up welding or 15 to 30 degrees for vertical down welding, and weld full length of the joint.

   Note: Push the electrode for vertical up welding.
   Drag the electrode for vertical down welding.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 11 (MANIPULATIVE OPERATIONS)

TITLE: Lap Joint in the Vertical Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates in the vertical position on a grounded metal table lapped half way on each other.
5. Tack weld plates together at each end of the plates.
6. Strike arc at one end, hold the electrode about 10 to 15 degrees for vertical up welding or 15 to 30 degrees for vertical down welding and weld full length of joint.

   Note: Push the electrode for vertical up welding.
   Drag the electrode for vertical down welding.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

DEMONSTRATION # 11 (MANIPULATIVE OPERATIONS)

TITLE: Outside Corner Joint in the Vertical Position

STEPS OF PROCEDURE:

1. Set polarity: D.C. reverse.
2. Set welding current: 80-120 amps.
3. Turn on welding machine.
4. Position plates in the vertical position on a grounded metal table with edges together and surfaces at right angles with each other.
5. Tack weld plates together at each end of plates.
6. Strike arc at one end, hold the electrode about 15 to 30 degrees for vertical down welding and weld full length of joint.

   Note: Drag the electrode for vertical down welding.
7. Chip off slag and wire brush the weld.
8. Inspect your weld for uniformity and quality.

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Butt Joint in the Vertical Position

Student's Name ____________________

	Yes	No
1. Set polarity: D.C. reverse.	____	____
2. Set welding current: 80-120 amps.	____	____
3. Turn on welding machine.	____	____
4. Position plates in the vertical position on a grounded metal table with the edges together.	____	____
5. Tack weld plates together at each end of the plates.	____	____
6. Strike arc at one end, hold the electrode about 10 to 15 degrees for vertical up welding or 15 to 30 degrees for vertical down welding, and weld bead full length of joint.	____	____
7. Chip off slag and wire brush the weld.	____	____
8. Inspect your weld for uniformity and quality.	____	____

Instructor's Name ____________________

Date ________________________________

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 — Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Tee Joint in the Vertical Position

Student's Name ____________________

	Yes	No
1. Set polarity: D.C. reverse.	___	___
2. Set welding current: 80-120 amps.	___	___
3. Turn on welding machine.	___	___
4. Position plates in the vertical position on a grounded metal table by setting the edge of one plate in the center of the other plate's surface.	___	___
5. Tack weld plates together at each end of plates.	___	___
6. Strike arc at one end, hold the electrode about 10 to 15 degrees for vertical up welding or 15 to 30 degrees for vertical down welding, and weld full length of the joint.	___	___
7. Chip off slag and wire brush the weld.	___	___
8. Inspect your weld for uniformity and quality.	___	___

Instructor's Name ____________________

Date ______________________________

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 **—** Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Lap Joint in the Vertical Position

Student's Name ____________________

		Yes	No
1.	Set polarity: D.C. reverse.	___	___
2.	Set welding current: 80-120 amps.	___	___
3.	Turn on welding machine.	___	___
4.	Position plates in the vertical position on a grounded metal table lapped half way on each other.	___	___
5.	Tack weld plates together at each end of the plates.	___	___
6.	Strike arc at one end, hold the electrode about 10 to 15 degrees for vertical up welding or 15 to 30 degrees for vertical down welding and weld full length of joint.	___	___
7.	Chip off slag and wire brush the weld.	___	___
8.	Inspect your weld for uniformity and quality.	___	___

Instructor's Name ____________________

Date ________________________________

LESSON PLAN # 11

COURSE TITLE/NO. Welding

UNIT # 1 **—** Shielded Metal Arc Welding
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Outside Corner Joint in the Vertical Position

Student's Name ____________________

	Yes	No
1. Set polarity: D.C. reverse.		
2. Set welding current: 80-120 amps.		
3. Turn on welding machine.		
4. Position plates in the vertical position on a grounded metal table with edges together and surfaces at right angles with each other.		
5. Tack weld plates together at each end of plates.		
6. Strike arc at one end, hold the electrode about 15 to 30 degrees for vertical down welding and weld full length of joint.		
7. Chip off slag and wire brush the weld.		
8. Inspect your weld for uniformity and quality.		

Instructor's Name ____________________

Date ________________________________

ENGLISH COMPETENCIES FOR C.E.T.A. SKILLS CLASSES

SKILLS CLASSES SERVICED BY ENGLISH TUTOR: AUTO MECHANICS, CLERICAL, DIESEL MECHANICS, FOOD SERVICE, MACHINE SHOP, AND WELDING SHOP.

PRIMARY COMPETENCIES: TASK ANALYSIS

Score 10.5 on the Language California Test of Adult Basic Education
Score 10.5 on the Reading California Test of Adult Basic Education
Score 45 on Pre-G.E.D. Test (Reading)
Score 45 on Pre-G.E.D. Test (Language)
Assist C.E.T.A. students with individual learning problems

SECONDARY COMPETENCIES: OCCUPATIONAL ANALYSIS

LANGUAGE DEVELOPMENT (All students working on primary competencies)

UNIT I

Identify the sentence subject and predicate
Identify kinds of sentences and types of punctuation
Demonstrate use of capitalization
Identify all nouns in a sentence by use
Demonstrate use of punctuation rules
Distinguish between direct and indirect quotations and punctuate accordingly
Demonstrate use of pronouns
Demonstrate flexibility in verbal and written vocabulary
Demonstrate awareness of subject-verb agreement and verb form
Communicate effectively using written and verbal language skills

CLERICAL ADVANCED (All of Ms. Pursley's students and other clerical students entering with language scores above 10.5)

UNIT II

Demonstrate the use of nouns in singular and plural form
Demonstrate the use of possessive nouns and pronouns
Demonstrate the use of subject and verb agreement
Demonstrate the use of business punctuation
Demonstrate the use of business capitalization
Demonstrate the use of business numbers
Demonstrate the use of business abbreviated forms

Proofreads clerical material
Spells 1000 words (Clerical Vocabulary)
Defines 1000 words (Clerical Vocabulary)
Writes sentences using 1000 spelling words (Clerical Vocabulary)
Locate and record information found in dictionaries and reference books

READING (Auto Mechanics, Diesel Mechanics, Food Service, Machine Shop, Welding Shop)

Recognizes 2400 sight words (Missouri Basic Word List)
Understands meaning of new words using sentence context
Follows directions
Finds facts
Locates answers
Recognizes the main idea
Detects sequence
Organizes ideas
Draws conclusions

GENERAL COMPETENCIES: (Added as time permits)

Follow written directions
Follow verbal directions
Complete an application form
Compose a Resume and a Cover Letter
Write a summary of skills learned in skills class
Spell and define trade terms or abbreviated forms
Use a newspaper and telephone book as a help in locating employment
Initiate a conversation using correct grammar
Write a legible guest check

INSTRUCTIONAL ANALYSIS

Course: English Tutor

Unit: Language Development (Unit 1)

Manipulative Skill	Informational Topic
	1. The Sentence Subject & Predicate
Identify Subject & Predicate of Sentence	
	2. Kinds of Sentences & Types of Punctuation
Identify Types of Sentences & Punctuate Accordingly	
	3. Capitilization
Capitalize Written Material	
	4. Nouns: Common and Proper
	5. Singular, Plural and Possessive Nouns
	6. Using Nouns
Identify All Nouns In A Sentence By Use	
	7. Punctuation Review
Punctuate Written Correspondence & Material	
	8. Using Quotations
Distinquish Between Direct & Indirect Quotations & Punctuate Accordingly	
	9. Recognizing Pronouns
	10. Building Verbal & Written Vocabulary

INSTRUCTIONAL ANALYSIS

Course: English Tutor

Unit: Language Development (Unit 1)

Manipulative Skill	Informational Topic
Demonstrate Flexibility In Verbal & Written Vocabulary	
	11. Verbs
	12. Subject/Verb Agreement
Demonstrate Awareness Of Subject/Verb Agreement And Verb Form	
	13. Identifying Adjectives
	14. Identifying Adverbs
	15. Prepositions
	16. Conjunctions
Communicate Effectively Using Written And Verbal Language Skills	

PROGRESS CHART

Course/Program ____________

Section ____________

Code ____________

ENGLISH COMPETENCIES

TUTOR	PRIMARY COMPETENCIES	Score 45 on Pre-GED	Test (Lang.)	Score 45 on Pre-GED	Test (Read.)	Score 10.5 on	Language T.A.B.	Score 10.5 on	Reading T.A.B.	Assist CETA student	with ind. learn.	problems		SECONDARY COMPETENCIES		LANGUAGE	Identify sen. subj.	& predicate	Identify kinds of sen.	& types of punctuation	Demon. proper sen.	structure & punc	Demon. use of capita	Ident. all nouns in	sentence by use	
AUTO MECHANICS		/	/	/	/	/	/	/	/	/	/	/					/	/	/	/	/	/	/	/		
CLERICAL (JOHNSON)		/	/	/	/	/	/	/	/	/	/	/					/	/	/	/	/	/	/	/		
CLERICAL (PURSLEY)																										
CLERICAL (MCMINN)		/	/	/	/	/	/	/	/	/	/	/					/	/	/	/	/	/	/	/		
DIESEL MECHANICS		/	/	/	/	/	/	/	/	/	/	/					/	/	/	/	/	/	/	/		
FOOD SERVICE		/	/	/	/	/	/	/	/	/	/	/					/	/	/	/	/	/	/	/		
MACHINE SHOP		/	/	/	/	/	/	/	/	/	/	/					/	/	/	/	/	/	/	/		
WELDING		/	/	/	/	/	/	/	/	/	/	/					/	/	/	/	/	/	/	/		

PROGRESS CHART

Course/Program PAGE 2

Section

Code

ENGLISH COMPETENCIES

TUTOR	Demon. use of punc.	rules	Dist. bet. dir. & indir	quot. & punc. accord	Demon. use of pronouns	Demon. flex. of verb	& written vocab.	Demon. aware. of	sub.-verb agree.	& verb form	Comm. effect. using	written & verbal	language skills												
AUTO MECHANICS	/	/	/	/	/	/	/	/	/	/	/	/	/												
CLERICAL (JOHNSON)	/	/	/	/	/	/	/	/	/	/	/	/	/												
CLERICAL (PURSLEY)																									
CLERICAL (MCMINN)	/	/	/	/	/	/	/	/	/	/	/	/	/												
DIESEL MECHANICS	/	/	/	/	/	/	/	/	/	/	/	/	/												
FOOD SERVICE	/	/	/	/	/	/	/	/	/	/	/	/	/												
MACHINE SHOP	/	/	/	/	/	/	/	/	/	/	/	/	/												
WELDING	/	/	/	/	/	/	/	/	/	/	/	/	/												

PROGRESS CHART

Course/Program PAGE 3
Section
Code
ENGLISH COMPETENCIES
TUTOR

	CLERICAL ADVANCED	Demon. use of nouns in	sing. & plural form	Demon. use of possessive	nouns & pronouns	Demon. use of subj.	verb agreement	Demon. use of busi.	punctuation	Demon. use of busi.	capitalization	Demon. use of busi	numbers	Demon. use of busi.	abbreviated forms	Proofreads cler. mat.	Defines 1000 words	Spells 1000 words	Writes sen. using	1000 spell. words	Locate and record	information found	in dictionaries	& reference book	
AUTO MECHANICS																									
CLERICAL (JOHNSON)																									
CLERICAL (PURSLEY)		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
CLERICAL (MCMINN)																									
DIESEL MECHANICS																									
FOOD SERVICE																									
MACHINE SHOP																									
WELDING																									

PROGRESS CHART

Course/Program PAGE 4

Section

Code

ENGLISH COMPETENCIES

TUTOR

	READING	Recog. 2400 sight words	Understands meaning of	new words using	sentence context	Follows directions	Finds facts	Locates answers	Recog. main idea	Detects sequence	Organizes ideas	Draws conclusions		GENERAL		Follow written dir.	Follow verbal dir.	Complete app. form	Compose resume and	cover letter	Write summary of skills	learned in skill class	Spell-Define trade	terms/abbrev. forms	Use news./tele. book as	help in loc. employ.	Initiate conversation using correct grammar	Write a legible guest check
AUTO MECHANICS		/	/	/	/	/	/	/	/	/	/	/				/	/	/	/	/	/	/	/	/	/	/	/	
CLERICAL (JOHNSON)																												
CLERICAL (PURSLEY)																												
CLERICAL (MCMINN)																												
DIESEL MECHANICS		/	/	/	/	/	/	/	/	/	/	/				/	/	/	/	/	/	/	/	/	/	/	/	
FOOD SERVICE		/	/	/	/	/	/	/	/	/	/	/				/	/	/	/	/	/	/	/	/	/	/	/	/
MACHINE SHOP		/	/	/	/	/	/	/	/	/	/	/				/	/	/	/	/	/	/	/	/	/	/	/	
WELDING		/	/	/	/	/	/	/	/	/	/	/				/	/	/	/	/	/	/	/	/	/	/	/	

LESSON PLAN # 1

LESSON PLAN FORMAT

COURSE TITLE/ÑO. English Tutor

UNIT # 1 Language Development

(UNIT TITLE)

SCOPE OF UNIT: Introduce all parts of speech so the student will be able to build his vocabulary and expand his knowledge of grammar in order to achieve: 1) a score of 10.5 on the Tests of Adult Basic Education (English); 2) a score of 55 or above on the G.E.D. English Pre-Test; or 3) increased knowledge for vocational on-the-job related activities.

INFORMATION TOPIC # 1 OR DEMONSTRATION # ______

The Sentence Subject and Predicate

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions:

1. Complete 10 sentences inserting a subject or predicate with 100% accuracy.
2. Complete 10 sentences inserting compound subjects or predicates with 100% accuracy.
3. Write 4 sentences using compound subjects and predicates with 90% accuracy.
4. Underline the subjects and predicates when given a short story with 90% accuracy.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pencil
Worksheets (zerox copies)
Paper

	(Name)	(Date)	Special Learning Features For:
Written By:	Sade	12/11/81	Individual Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Varnado, Jewel. Learning Our Language, Revised, Book 2. Austin, TX: Steck-Vaughn, 1974. Units 1 and 2, pages 3-15.

REFERENCES: (BIBLIOGRAPHY DATA)

Same as above

Clark and Schachter. English The Easy Way, 4th edition. Cincinnati, OH: South-Western Publishing Co., 1977.

Grizzard, M. A. Language Skills-Book 610. Austin, TX: Steck-Vaughn, 1978.

Varnado, Jewel. English Essentials Revised. Austin, TX: Steck-Vaughn, 1974.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In today's world the most important skill you can develop is language expression. In order to communicate, you must be able to express yourself in the written language as well as verbally. It is essential in job-seeking skills that you write on paper what you want your prospective employer to know. You must have a basic knowledge of grammar and sentence structure.

LESSON PLAN # 1

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development
(Unit or Block Title)

INFORMATION TOPIC # 1 **(Technical - General - Guidance)**

TITLE: The Sentence Subject and Predicate

OUTLINE:

I The Sentence

A. Express a Complete Thought

B. Two Main Parts

1. Definition subject: Names person, place, or thing about which we are talking or writing.

2. Definition predicate: Tells something that the subject is or does.

II Subject

A. Simple Subject

1. Most important word in sentence.

Interaction Item # 1

2. Exercise # 1

B. Complete Subject

1. Simple subject plus all words that describe it.

Interaction Item # 2

2. Exercise # 2

C. Inverted Word Order

1. Subject generally follows predicate in a question sentence.

2. Subject generally follows predicate after Here or There.

Interaction Item # 3

3. Exercise # 3

D. Understood Subject

1. "You" is often used as subject of sentence.

2. When making a request or command, the subject may be understood. (You)

Interaction Item # 4

a. Exercise # 4

E. Compound Subject

1. Definition: Two or more connected subjects used with the same predicate.

a. Conjunctions
b. Commas

Interaction Item # 5

c. Exercise # 5

III Sentence Predicate

A. Simple Predicate

1. Definition: Verb or verb phrase that expresses or shows existence or state of being.

Interaction Item # 6

2. Exercise # 6

B. Complete Predicate

1. Definition: Verb and all other words in the sentence that tell something that the subject is or does.

Interaction Item # 7

2. Exercise # 7

C. Inverted Word Order

1. In a question sentence the subject usually follows the verb or part of the predicate.

Interaction Item # 8

2. Exercise # 8

D. Compound Predicate

1. Definition: Two or more verbs that are used with the same subject and joined by a conjunction.

    a. by, and, or
    b. Punctuation

Interaction Item # 9

2. Exercise # 9

E. Compound Subjects and Predicates

1. Definition: Two or more subjects used with two or more verbs.

    a. Conjunctions
    b. Punctuation

Interaction Item # 10

2. Exercise # 10

IV Summary and Conclusion

A. The Sentence

B. Sentence Subject

C. Sentence Predicate

D. A sentence has three components: a subject, a predicate, and a conclusion. The sentence must express a complete thought. If you can identify the subject and predicate of the sentence and recognize if your sentence is a complete thought, you can express your thoughts in written form.

LESSON PLAN # 1

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development-The Sentence Subject and Predicate
(Unit Title)

INFORMATION TOPIC # 1 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is the most important word in a sentence?
2. What is a complete subject?
3. When does a subject follow the predicate?
4. What is an understood subject?
5. Can sentences have more than one subject?
6. What is a simple predicate?
7. What is a complete predicate?
8. What happens to the sentence structure in a question sentence?
9. What is a compound predicate?
10. Can sentences have two or more verbs and/or subjects?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Do the following exercises from Learning Our Language:

1. Exercise A page 3
2. Exercise B pages 4-5
3. Exercise C page 6
4. Exercise D pages 6-7
5. Exercise E pages 7-8
6. Exercise A page 10
7. Exercise B page 11
8. Exercise C page 12
9. Exercise D page 13
10. Exercise E page 14

LESSON PLAN # 1

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Part I

A: Complete the following sentences by adding a subject to each of the complete predicates.

1. ____________________ bought a new television set.
2. There are many ____________________ in the sky.
3. ____________________ ran to the window and shouted.
4. Here is the ____________________ from the grocery store.
5. When will ____________________ go back to work?

B: Complete the following sentences by adding a predicate to each of the complete subjects given.

1. Dick and Ramon ____.
2. There _______________ two cans of paint _______________.
3. David Robinson ____.
4. You ____.
5. We ____.

Part II

A. Complete the following sentences by adding a compound subject to each of the predicates given.

1. _______________ and _______________ went to work at seven o'clock.
2. _______________ and _______________ fluttered slowly to the ground.
3. _______________ and _______________ are two western states.
4. ____________, ____________, and ____________ are my favorite foods.

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Columbia, Missouri 65205

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5. There on the floor were my ______________ and ____________.

B. Complete the following sentences by adding compound predicates to each of the subjects given.

1. A small airplane ____.

2. The foreman ____.

3. Two firemen ____.

4. Will you ______________ the book and _____________________ the first sentence?

5. Bill ______________ the ball and ____________ it to Jack.

Part III A. Write two sentences in which the subjects or the predicates are compound. Write two additional sentences in which both the subjects and the predicates are compound.

1. ____

____

2. ____

____

3. ____

____

4. ____

____

Part IV

Underline the subjects & predicates in the following short story.

Alaska is the largest state in the Union. This big territory was bought from Russia. The cost of this land was $7,200,000. Many people considered this purchase a waste of money. These people were mistaken. An abundance of gold, fish, timber, and other natural resources have been found throughout Alaska.

There is a great variety of weather in Alaska. The coldest part of the state lies north of the Arctic Circle. The southern and southeastern areas have fairly mild temperatures all year.

Knives, forks, and spoons have not always been used by people. The fingers and hands were once used in eating all foods in almost all countries.

Our forefathers really had horrible manners. The hunting knife was used to cut food into huge chunks. The hands carried it to the mouth. The teeth gnawed it apart. Early man was very much like other animals.

Hans Christian Andersen was born in 1805. Denmark was his homeland. His father was a shoemaker. His father was also a good storyteller. Hans and his mother often listened to his father's stories.

Hans's family was very poor. There was never enough money. The mother did washing for other people. The father made shoes. Hans went to school. The boy did not like school. His mind was always on stories. The teachers did not like Hans. They wanted him to study instead of writing stories.

The children at the school adored Hans. His puppets, his songs, and his stories delighted them. Hans enjoyed telling stories to the children. He later wrote many books and stories for other children. He also wrote stories for adults. His adult stories never became popular. The grown-ups liked the children's stories. The songs and stories soon became popular all over the world. America, France, England, and Denmark honored him.

Hans Christian Andersen died in 1875, but his fame as a writer and as a storyteller has lived long after him. His delightful stories have been told throughout the world. Today, children in almost every country enjoy his Danish fairy tales.

LESSON PLAN # 2

LESSON PLAN FORMAT

COURSE TITLE/NO. English Tutor

UNIT # 1 Language Development

(UNIT TITLE)

SCOPE OF UNIT: Introduce all parts of speech so the student will be able to build his vocabulary and expand his knowledge of grammar in order to achieve: 1) a score of 10.5 on the Tests of Adult Basic Education (English); 2) a score of 55 or above on the G.E.D. English Pre-Test; or 3) increased knowledge for vocational on-the-job related activities.

INFORMATION TOPIC # 2 OR DEMONSTRATION # ______

Kinds of Sentences and Types of Punctuation

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 95% accuracy:

1. Identify kinds of sentences.
2. Distinguish between simple & compound sentences & insert punctuation.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pencil
Worksheets (zerox copies)

	(Name)	(Date)	Special Learning Features For:
Written By:	Sade	12/18/81	Individual Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Varnado, Jewel. Learning Our Language, Revised, Book 2. Austin, TX: Steck-Vaughn, 1974. Pages 16-22.

REFERENCES: (BIBLIOGRAPHY DATA)

Grizzard, Mable. Language Skills-Book 610. Austin, TX: Steck-Vaughn, 1978.

Littell, Seabright, Laya, Mularski and Williams. English Style Skill Builders. Evanston, IL: McDougal, Littell and Co., 1977.

Varnado, Jewel. English Essentials. Austin, TX: Steck-Vaughn, 1974.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Sentences are given different names depending upon what the speaker or writer has to say. By learning different types of sentence structures, you can learn to express yourself very clearly, verbally and in written form. In this lesson we will discuss types and structures of sentences so you can become aware of your own level and build your individual communication skills.

LESSON PLAN # 2

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development
(Unit or Block Title)

INFORMATION TOPIC # 2 (Technical - General - Guidance)

TITLE: Kinds of Sentences and Types of Punctuation

OUTLINE:

I Kinds of Sentences

A. Declarative

1. Definition: Makes statement, tells about something.
2. Punctuation
3. Exercise # 1

B. Interrogative

1. Definition: Asks a question.
2. Punctuation
3. Exercise # 2

C. Imperative

1. Definition: Gives an order, makes a request.
2. Punctuation
3. "You" understood subject
4. Exercise # 3

D. Exclamatory

1. Definition: Express strong feeling or excitement.
2. Punctuation
3. Exercise # 4

Interaction Item # 1

II Building Sentences

A. Simple Sentences

1. Definition: One subject; one predicate.
2. Subject and predicate may be compound.
3. Expresses only one main thought.
4. Exercise # 5

B. Compound Sentences

1. Definition: Two or more related simple sentences joined together with a conjunction/punctuation or both.
2. Independent clauses

Interaction Item # 2

3. Conjunctions

Interaction Item # 3

4. Punctuation
5. Exercise # 6, # 7, # 8

III Summary and Conclusion

A. Kinds of Sentences

B. Building Sentences

C. Using different kinds of sentences and combining your thoughts together by writing more complex sentences, can be a valuable tool in interviews as well as in every-day communication skills. As you begin recognizing sentence structures, you can experiment by noticing how newspaper and magazine articles are written and how advertisements can persuade you to buy products that you might not have considered until you heard or read their advertisement.

LESSON PLAN # 2

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development-Kinds of Sentences and Types of Punctuation
(Unit Title)

INFORMATION TOPIC # 2 or DEMONSTRATION #________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are the four kinds of sentences? Give me an example of each.
2. What is the difference between a compound and simple sentence?
3. When would you use a semicolon in a compound sentence?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Do the following exercises from Learning Our Language:

1.	Exercise A	page 16
2.	Exercise B	pages 16-17
3.	Exercise C	page 17
4.	Exercise D	page 17
5.	Exercise A	page 19
6.	Exercise B	pages 20-21
7.	Exercise C	page 21
8.	Exercise D	pages 21-22

LESSON PLAN # 2

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Part I

Identify each of these sentences by using the following abbreviations: D for declarative, IT for interrogative, IP for imperative, and E for exclamatory. Write the abbreviation in the blank before the sentence.

1. ______ Dr. West is at the hospital.
2. ______ How much oxygen is there in air?
3. ______ Report to the manager at eight o'clock.
4. ______ What did you say about me?
5. ______ After the party we will drive to Los Angeles.
6. ______ Look at what you are doing!
7. ______ How lucky we are!
8. ______ Turn right at the first traffic light.
9. ______ How long have you known James Sheppard?
10. ______ What a cold day this is!
11. ______ Sacramento is the capital of California.
12. ______ Yesterday we had to work overtime.
13. ______ Did you buy that used car?
14. ______ Make a grocery list before you go to the store.
15. ______ Isn't this the last game of the season?
16. ______ Hurry! Hurry!

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Columbia, Missouri 65205

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17. ______ He is my favorite television star.

18. ______ What a terrible accident they had!

19. ______ Why do you especially like this house?

20. ______ Many words have more than one meaning.

Part II

Identify each sentence as S for simple or C for compound and insert punctuation.

1. ______ The house and garden were opened to the public

2. ______ Please read this carefully it is very important

3. ______ The man at the door is an F B I agent

4. ______ Bring the food and the drinks to the table

5. ______ We will go but we must return by midnight

6. ______ Parents and teachers cheered and applauded

7. ______ Why do you insist upon leaving so soon

8. ______ They must accept this plan or they must make one of their own

9. ______ He raised the flag the people stood

10. ______ What did he say and do to them

11. ______ The temperature was low and the humidity was high

12. ______ In 1974 Hank Aaron set a new lifetime home run record

LESSON PLAN # 3

LESSON PLAN FORMAT

COURSE TITLE/NO. English Tutor

UNIT # 1 Language Development

(UNIT TITLE)

SCOPE OF UNIT: Introduce all parts of speech so the student will be able to build his vocabulary and expand his knowledge of grammar in order to achieve: 1) a score of 10.5 on the Tests of Adult Basic Education (English); 2) a score of 55 or above on the G.E.D. English Pre-Test; or 3) increased knowledge for vocational on-the-job related activities.

INFORMATION TOPIC # 3 OR DEMONSTRATION # ________

Capitalization

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 90% accuracy:

1. Underline each word in a letter that should begin with a capital letter.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pencil
Worksheets

	(Name)	(Date)	Special Learning Features For:
Written By:	Sade	1/8/82	Individual Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Varnado, Jewel. Learning Our Language, Revised, Book 2. Austin, TX: Steck-Vaughn, 1974. Unit 5, pages 23-26.

REFERENCES: (BIBLIOGRAPHY DATA)

Grizzard, Mable. Language Skills-Book 610. Austin, TX: Steck-Vaughn, 1978.

Littell, Seabright, Laya, Mularski and Williams. English Style Skill Builders. Evanston, IL: McDougal, Littell and Co., 1977.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

If you want to write a letter correctly for personal reasons, or make a good impression on a perspective employer; you must know the rules for capitalization especially in writing letters, requesting application forms or composing a resume.

LESSON PLAN # 3

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development
(Unit or Block Title)

INFORMATION TOPIC # 3 (Technical - General - Guidance)

TITLE: Capitalization

OUTLINE:

I When Should You Use Capital Letters?

A. Rules for Capitalization

1. First word in sentence
2. Persons proper names
3. Initials
4. I
5. Months
6. Days of week
7. Holidays
8. Countries, states, cities
9. Streets, avenues, routes
10. Buildings, mountains, parks and bodies of water
    - a) Only well-known

Interaction Items # 1 and # 2

11. Titles with names
    - a) Titles after names
12. First word, name, title in greeting of letter
13. First word in closing phrase of letter
14. Important words of books, stores, movies and song
    - a) Unimportant words
    - b) First and last word

Interaction Item # 3

15. Companies, businesses, clubs and historical events
16. Biblical words
17. Poetry

B. Words Not Capitalized

1. Seasons

Interaction Item # 4

2. School subjects
    a) Exception

Interaction Item # 5

3. Flowers, fruits, vegetables, trees and birds
4. Games
    a) Exception

II Summary and Conclusion

A. When Do You Use Capitalization?

B. Whether or not a word is capitalized may affect its meaning in the English language. Although capitalization is not significant in verbal communication, it is very important in the written form. You must know and use the rules of capitalization if you want to write correctly. Try to visualize each rule with a particular situation. This will definitely help you to retain the rules for necessary recall.

LESSON PLAN # 3

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development - Capitalization
(Unit Title)

INFORMATION TOPIC # 3 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are some well-known buildings, mountains, parks, and bodies of water?
2. What are some buildings, mountains, parks, and bodies of water? (unknown)
3. What are unimportant words?
4. Why are seasons not capitalized when months are?
5. Why are some school subjects capitalized while others are not?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Do the following exercise from Learning Our Language:

1. Exercise 1-3 pages 26-27

2. Students give tutor examples of each rule and discusses it before preceding onto next rule.

LESSON PLAN # 3

COURSE TITLE/NO. English Tutor

UNIT # 1 **—** Language Development - Capitalization
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Underline each word in the following letter that should be capitalized.

dear parents,

you are invited by our local p.t.a. to attend a picnic at goldhead park. it is the annual bryton elementary school get-together.

the picnic will be on saturday, june 6. please bring food for your family. drinks may be bought at the park.

at three o'clock, james l. easterling, superintendent of clay public schools, will discuss the building program planned for our schools.

please come!

sincerely yours,

mrs. harold bishop
president, p.t.a.

LESSON PLAN # 4

LESSON PLAN FORMAT

COURSE TITLE/NO. English Tutor

UNIT # 1 Language Development

(UNIT TITLE)

SCOPE OF UNIT: Introduce all parts of speech so the student will be able to build his vocabulary and expand his knowledge of grammar in order to achieve: 1) a score of 10.5 on the Tests of Adult Basic Education (English); 2) a score of 55 or above on the G.E.D. English Pre-Test; or 3) increased knowledge for vocational on-the-job related activities.

INFORMATION TOPIC # 4 OR DEMONSTRATION # ______

Nouns: Common and Proper

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 90% accuracy:

1. Identify all nouns given eight sentences.

2. Rewrite each sentence replacing common nouns with proper nouns.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pencil
Worksheets

	(Name)	(Date)	Special Learning Features For:
Written By:	Sade	1/8/82	Individual Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Varnado, Jewel. Learning Our Language, Revised, Book 2. Austin, TX: Steck-Vaughn, 1974. Unit 6, pages 27-28.

REFERENCES: (BIBLIOGRAPHY DATA)

Clark and Schachter. English the Easy Way, Fourth edition. Cincinnati, OH: South-Western Publsihing Co., 1977.

Grizzard, Mable. Language Skills-Book 720. Austin, TX: Steck-Vaughn, 1978.

Varnado, Jewel. English Essentials Revised. Austin, TX: Steck-Vaughn, 1974.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

A noun is a person, place or thing and can either be proper or common depending upon how it is used and how specific it is. In our culture we name every object for identification; therefore, the noun is the most commonly used part of speech upon which we build our sentence structure. Today we will discuss what a noun is and how you identify it.

LESSON PLAN # 4

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development
(Unit or Block Title)

INFORMATION TOPIC # 4 (Technical - General - Guidance)

TITLE: Nouns: Common and Proper

OUTLINE:

I Introduction to Nouns

A. All nouns are the name of something.

Interaction Item # 1

B. Definition: A noun tells the name of a person, place or thing.

Interaction Item # 2

II Two Classes of Nouns

A. Proper

1. Definition: Names a particular person, place, or thing.
2. Always begins with a capital letter.

Interaction Item # 3

B. Common

1. Definition: Names any one of a group of things.
2. It doesn't name a particular person, place or thing.
3. It doesn't begin with a capital letter unless it is the first word in a sentence or must be capitalized for some other reason.

Interaction Item # 4

4. Exercise # 1

Interaction Item # 5

Interaction Item # 6

III Summary and Conclusion

A. Introduction to Nouns

B. Two Classes of Nouns

C. A sentence is built around its subject, which generally is the first noun in the sentence. If you can identify the nouns in a sentence it will be much easier for you to identify the other parts of speech we will cover in later instruction. Remember, a noun is always a person, place, or thing and can stand alone.

LESSON PLAN # 4

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development-Nouns: Common & Proper
(Unit Title)

INFORMATION TOPIC # 4 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Can you name something in this room that would be a noun?
2. Can you name a noun that is a person; a place; a thing?
3. Can you name five proper nouns?
4. Can you name five common nouns?
5. What are the two classes of nouns?
6. Which class of noun is always capitalized?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Do the following exercise from Learning Our Language:

1. Exercise A pages 27-28

LESSON PLAN # 4

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development-Nouns: Common & Proper

(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Directions:
(1) Underline each common noun in each of the following sentences.
(2) Rewrite each sentence replacing each underlined noun with a proper noun.

Sample:
The river flows through that town.
The Missouri River flows through St. Louis.

(1) The store is across the street from the bank.

(2) The woman was born in a southwestern state.

(3) The holiday comes in the last month.

(4) That river is the longest in this country.

(5) The person traveled from one city to another city.

(6) That building is the tallest in our town.

(7) My brother works for that company.

(8) That city is the largest in the state.

LESSON PLAN # 5

LESSON PLAN FORMAT

COURSE TITLE/NO. English Tutor

UNIT # 1 Language Development

(UNIT TITLE)

SCOPE OF UNIT: Introduce all parts of speech so the student will be able to build his vocabulary and expand his knowledge of grammar in order to achieve: 1) a score of 10.5 on the Tests of Adult Basic Education (English); 2) a score of 55 or above on the G.E.D. English Pre-Test; or 3) increased knowledge for vocational on-the-job related activities.

INFORMATION TOPIC # 5 OR DEMONSTRATION # ______

Singular, Plural and Possessive Nouns

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 90% accuracy:

1. Given a singular form noun complete sentences with the plural form.
2. Write the possessive form of each given noun and write a sentence using the possessive form.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pencil
Worksheets

	(Name)	(Date)	Special Learning Features For:
Written By:	Sade	1/15/82	Individual Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Varnado, Jewel. Learning Our Language, Revised, Book 2. Austin, TX: Steck-Vaughn, 1974. Unit 7, pages 29-34.

REFERENCES: (BIBLIOGRAPHY DATA)

Clark and Schachter. English The Easy Way, Fourth edition. Cincinnati, OH: South-Western Publishing Co., 1977.

Grizzard, Mable. Language Skills-Book 720. Austin, TX: Steck-Vaughn, 1978.

Littell, Seabright, Laya, Mularski and Williams. English Style Skill Builders. Evanston, IL: McDougal, Littell and Co., 1977.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

We have learned that a noun is a person, place or something. Nouns can be either singular or plural depending on the number of persons, places or things. A noun may also be used to show possession or ownership of another noun. Today we will review the rules that make nouns singular and plural as well as how to use nouns as possessives.

LESSON PLAN # 5

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development
(Unit or Block Title)

INFORMATION TOPIC # 5 (Technical - General - Guidance)

TITLE: Singular, Plural and Possessive Nouns

OUTLINE:

I Singular and Plural Nouns

A. Singular Nouns

1. Definition: Names only one person, place or thing.

Interaction Item # 1

B. Plural Nouns

1. Definition: Refers to more than one person, place or thing.
2. Many nouns form their plurals by adding s to the singular word.

Interaction Item # 2

   a. Exercise # 1

3. Words that end in s, sh, ch, z, or x usually form their plurals by adding es to the singular word.
   a. Exception: The plural form of ox is oxen.
   b. Exercise # 2
4. The plural of a noun that ends in y following a, e, i, o, or u is formed by adding s to the singular word.
5. The plural of a noun that ends in y following any letter besides a, e, i, o, or u is formed by changing the y to i and es to the singular word.
   a. Exercise # 3
6. Almost all nouns that end in f or fe form their plurals by adding s to the singular word.
   a. Fourteen exceptions: F or fe is changed to v before adding es.
   b. Exercise # 4
7. Nouns that end in o and have a, e, i, o, or u before the o form their plurals by adding s to the singular noun. Nouns that end in o and have any letter except a, e, i, o, or u before the o form their plurals by adding es to the singular noun.
   a. Exceptions: Musical terms; instruments.
   b. Exercise # 5

Interaction Items # 3, # 4, # 5, # 6

8. Some nouns form their plurals by a change in the spelling of the singular word.
    a. Examples
9. Some nouns are the same in singular and plural forms.
    a. Examples
10. Some nouns are always plural in form.
    a. Examples
11. Letters, figures and signs are made plural by adding an apostrophe and s to the singular form.
    a. Examples
    b. Exercise # 6

Interaction Item # 7

II Showing Possession Or Ownership in Nouns

A. Definition: Names who or what owns the second noun.

B. To form the possessive of a singular noun, add an apostrophe and s to the singular noun.

1. Examples

C. To form the possessive of plural nouns ending in s, add an apostrophe after the s used to make the noun plural.

1. Examples

D. To form the possessive of plural nouns not ending in s, add an apostrophe and s to the noun.

Interaction Items # 8, # 9, # 10

1. Examples
2. Exercise # 7
3. Exercise # 8

III Summary and Closure

A. Singular and Plural Nouns

B. Showing Possession and Ownership in Nouns

C. The noun is the foundation of sentence structure. The flexibility of using singular, plural, or possessive forms of nouns will enhance your writing style for specific interpretation. When in doubt about single, plural, or possessive forms of nouns - use your dictionary.

LESSON PLAN # 5

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development-Singular, Plural & Possessive Nouns
(Unit Title)

INFORMATION TOPIC # 5 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is a plural noun?
2. How do most nouns form their plurals?
3. How do you make a noun plural if it ends in "ch"?
4. How do you make a noun plural if it ends in "ay"?
5. What is the exception to nouns that end in "f" or "fe" when made plural?
6. How do you make the word "piano" plural?
7. When do you use an "apostrophe s" when making a noun plural?
8. When do you use a possessive noun?
9. How do you make a singular noun possessive?
10. How do you make a plural noun possessive?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

Do the following exercises from Learning Our Language:

1. Exercise A page 29
2. Exercise B pages 29-30
3. Exercise C page 30
4. Exercise D page 31
5. Exercise E page 31
6. Review pages 32-33
7. Exercise F pages 33-34
8. Exercise G page 34

LESSON PLAN # 5

COURSE TITLE/NO. English Tutor

UNIT # 1 — Language Development-Singular, Plural & Possessive Nouns

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Part I

Directions: Fill the blank in each sentence with the possessive form of the word in parentheses:

1. (company) The ______________ picnic will be at the park Saturday afternoon.
2. (dog) That ______________ owner should pay for the damage it did.
3. (women) The ______________ organization of the church planned the meeting.
4. (Richard) ______________ account of his trip was very interesting.
5. (Father) ______________ explanation of the problem was very clear.
6. (cat) My ______________ eyes are blue.
7. (Franklin) ______________ brother made the candy for our party.
8. (Men) ______________ coats are sold at the store in that block.
9. (car) That ______________ engine is on fire!
10. (brother) We want to go to his ______________ ranch.
11. (child) A ______________ toy was found in our yard.
12. (captain) The ______________ship was one of the newest.
13. (baby) That dog played with the ______________ shoe.
14. (teacher) Her ______________ name is Miss Gustafson.
15. (Benny) We are going to ______________ party tomorrow.
16. (deer) They saw a ______________ track in the snow.
17. (Sue) ______________ work is the neatest I have ever seen.
18. (country) We display our ______________ flag every day.
19. (redbird) I have heard that ______________ call every day this week.

20. (minister) The ______________ sermon was much too long.

21. (sister) Marjory wants to wear her ______________ sweater.

22. (Spot) We found ______________ food spilled on the floor.

23. (children) The ______________ parade is held every spring.

24. (neighbor) Our ______________ yard has just been mowed.

25. (class) It is this ______________ time to take the test.

26. (ladies) This store sells ______________ clothes.

27. (woman) The ______________ exhibit of industrial designs won first place.

28. (squirrel) The ______________ teeth were very sharp.

29. (woman) The ______________ real estate business is very successful.

Part II - A

Directions: Write the possessive form of each of the following words:

1. girl ____________________
2. child ____________________
3. women ____________________
4. children ____________________
5. John ____________________
6. baby ____________________
7. boys ____________________
8. teacher ____________________
9. Dr. Ray ____________________
10. ladies ____________________
11. brother ____________________
12. soldier ____________________
13. men ____________________
14. aunt ____________________
15. pony ____________________

Part II - B

Directions: Use each possessive formed above in a sentence.

1. ____

2. ____

3. ____

4. ______________________________

5. ______________________________

6. ______________________________

7. ______________________________

8. ______________________________

9. ______________________________

10. ______________________________

11. ______________________________

12. ______________________________

13. ______________________________

14. ______________________________

15. ______________________________

MATHEMATICS COMPENTENCIES FOR C.E.T.A. SKILLS CLASSES

SKILLS CLASSES SERVICED BY MATHEMATICS TUTOR: AUTO MECHANICS, CLERICAL, DIESEL MECHANICS, FOOD SERVICE, MACHINE SHOP AND WELDING SHOP.

Students in the skills classes will have a 9.5 (according to the T.A.B.) grade level in mathematics. The mathematics tutor will work with students that have a 9.5 grade level or lower. Those above 9.5 grade level will receive help when it is requested by them.

PRIMARY COMPENTENCIES FOR ALL SKILLS CLASSES:

Whole Numbers

Addition, Subtraction, Multiplication, Division

Decimal Numbers

Addition, Subtraction, Multiplication, Division

Fractions

Addition, Subtraction, Multiplication, Division

Word Problems

Addition, Subtraction, Multiplication, Division

SECONDARY COMPENTENCIES FOR INDIVIDUAL SKILL:

I Auto Mechanics

A. Ratio and Proportions

  1) Ratios of Numbers
  2) Proportion

B. Measurement for Shop

  1) Measurement in Lengths
  2) Measurement in Capacity
  3) Measurement in Weights
  4) Reading the Micrometer

C. Percents in Business

   1) Calculate Discounts
   2) Calculate Mark-Up
   3) Figure Interest
   4) Figure Depreciation

D. Fundamentals of Metric System

   1) Metric Prefixes
   2) Conversion of Metrics to Metrics
   3) Conversion of Metric Measure to English Measure and English Measure to Metric Measure

II Clerical

A. Percents

   1) Percents Smaller Than 1%
   2) Finding Commission and Net Amount
   3) Percent of Decrease
   4) Percent of Increase
   5) Finding Part of a Number
   6) Finding Number from Part
   7) Finding Number from a Given Percent
   8) Finding the Original Price
   9) Finding What Percent One Number is of Another

B. Percent in Business

   1) Calculate Discount
   2) Calculate Mark-Up
   3) Figuring Interests
   4) Figuring Depreciation

C. Fundamentals of Metric System

   1) Metric Prefixes
   2) Conversion of Metrics to Metrics
   3) Conversion of Metric Measurement to English Measurement and English Measurement to Metric Measurement

III Diesel Mechanics

A. Ratio and Proportion

   1) Ratios of Numbers
   2) Proportion

B. Measurement for Shop

   1) Measurement in Lengths
   2) Measurement in Weights
   3) Measurement in Capacity
   4) Reading the Micrometer

C. Percent in Business

   1) Calculate Discounts
   2) Calculate Mark-Up
   3) Figuring Interests
   4) Figuring Depreciation

D. Fundamentals of the Metric System

   1) Metric Prefixes
   2) Conversion of Metrics to Metrics
   3) Conversion of Metric Measurement to English Measurement and English Measurement to Metric Measurement

IV Food Service

A. Measurement for Cooking

   1) Liquid Measurement
   2) Weight Measurement

B. Making Change From The Cash Register

   1) Making Change For Less Than A Dollar
   2) Making Change For More Than A Dollar

C. Percent in Food Service

   1) Increase Recipes With Given Proportion
   2) Decrease Recipes With Given Proportion
   3) Calculate Weight Loss
   4) Food Cost Percent
   5) Labor Cost Percent

D. Percent in Business

   1) Calculate Discounts
   2) Calculate Mark-Up
   3) Figuring Interests
   4) Figuring Depreciation

E. Fundamentals of Metrics

1) Metric Prefixes
2) Conversion of Metrics to Metrics
3) Conversion of Metric Measurement to English Measurement and English Measurement to Metric Measurement

V Machine Shop

A. Ratio and Proportion

1) Ratios of Numbers
2) Proportion

B. Square Root

1) Introduction to Square Root
2) Uses of Square Root

C. Geometry

1) Fundamentals of Geometry
2) Uses of Geometry

D. Trigonometry

1) Fundamentals of Trigonometry
2) Uses of Trigonometry

E. Measurement for Shop

1) Measurement in Lengths
2) Measurement in Weights
3) Measurement in Capacity
4) Reading the Micrometer

F. Fundamentals of the Metric System

1) Metric Prefixes
2) Conversion of Metrics to Metrics
3) Conversion of Metric Measurement to English Measurement and English Measurement to Metric Measurement

G. Percent in Business

1) Calculate Discounts
2) Calculate Mark-Up
3) Figuring Interests
4) Figuring Depreciation

VI Welding

A. Ratio and Proportion

1) Ratios of Numbers
2) Proportion

B. Square Root

1) Introduction of Square Root
2) Uses of Square Root

C. Geometry

1) Fundamentals of Geometry
2) Uses of Geometry

D. Trigonometry

1) Fundamentals of Trigonometry
2) Uses of Trigonometry

E. Measurement for Shop

1) Measurement in Lengths
2) Measurement in Weights
3) Measurement in Capacity

F. Percent in Business

1) Calculate Discounts
2) Calculate Mark-Up
3) Figuring Interests
4) Figuring Depreciation

G. Fundamentals of Metrics

1) Metric Prefixes
2) Conversion of Metrics to Metrics
3) Conversion of Metric Measurement to English Measurement and English Measurement to Metric Measurement

PROGRESS CHART

Course/Program ____________

Section ____________

Code ____________

	GEOMETRY	Fundamentals of Geom.	Uses of Geometry	TRIGONOMETRY	Fundamentals of Trig.	Uses of Trigonometry	MEASUREMENT FOR SHOP	Measurement in Lengths	Measurement in Weights	Measurement in Capacity	Reading the Micrometer	MEASUREMENT FOR COOKING	Liquid Measurement	Weight Measurement	MAKING CHANGE-CASH REG.	Making change-less than $	Making change-more than $	PERCENTS	Percents Smaller than 1%	Finding Comm. & Net Amt.	Percent of Decrease	Percent of Increase	Finding Part of a Number	Finding Number from Part	Finding Number from %	Finding Orig. Price	Finding What Percent One Number is of Another
AUTO MECHANICS							✓	✓	✓	✓	✓																
CLERICAL (JOHNSON)																		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CLERICAL (MCMINN)																		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CLERICAL (PURSLEY)																		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DIESEL MECHANICS							✓	✓	✓	✓	✓																
FOOD SERVICE												✓	✓	✓	✓	✓	✓										
MACHINE SHOP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																
WELDING	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																

PROGRESS CHART

Course/Program ____________

Section ____________

Code ____________

	WHOLE NUMBERS	Addition	Subtraction	Multiplication	Division	DECIMALS	Addition	Subtraction	Multiplication	Division	FRACTIONS	Addition	Subtraction	Multiplication	Division	WORD PROBLEMS	Addition	Subtraction	Multiplication	Division	RATIO & PROPORTION	Ratios of Numbers	Proportion	SQUARE ROOT	Intro.-Square Root	Uses-Square Root
AUTO MECHANICS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
CLERICAL (JOHNSON)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
CLERICAL (MCMINN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
CLERICAL (PURSLEY)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
DIESEL MECHANICS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
FOOD SERVICE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
MACHINE SHOP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WELDING	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

PRC ESS CHART

Course/Program ____________

Section ____________

Code ____________

	PERCENT IN FOOD SERVICE	Inc. Recipes-Given Prop.	Dec. Recipes-Given Prop.	Calculate Weight Loss %	Food Cost Percent	Labor Cost Percent	PERCENT IN BUSINESS	Calculate Discounts	Calculate Mark-Up	Figuring Interests	Figuring Depreciation	FUNDAMENTALS-METRIC SYS.	Metric Prefixes	Conversion of Met. to Met.	Conversion of Metric Measure.	to English Measure. and	English Measure. to Metric	Measure.
AUTO MECHANICS							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
CLERICAL (JOHNSON)							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
CLERICAL (MCMINN)							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
CLERICAL (PURSLEY)							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
DIESEL MECHANICS							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
FOOD SERVICE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
MACHINE SHOP							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
WELDING							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	

LESSON PLAN # 1

LESSON PLAN FORMAT

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 Fundamentals of the Metric System

(UNIT TITLE)

SCOPE OF UNIT: The purpose of this unit is to give a brief introduction to the metric system. We will discuss metric prefixes, conversion of metrics to metrics within its own measurement system, and conversion of metric measurement to English measurement and vice versa.

INFORMATION TOPIC # 1 OR DEMONSTRATION # ______

Metric Prefixes

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 100% accuracy:

1. Identify the eight prefix values of the metric system.
2. List the three types of unit measure used in the metric system.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Paper
Pencil
Duplicating Master
Typewriter

	(Name)	(Date)	Special Learning Features For:
Written By:	Millsap	6/21/82	Individual Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Devine, Donald F. and Jerome E. Kaufmann. Mathematics for Elementary Education. New York, NY: John Wilsy and Sons, Inc., 1974. Pages 259-261.

REFERENCES: (BIBLIOGRAPHY DATA)

Breneman, John W., Associate Professor of Engineering Mechanics. Mathematics, Second Edition. New York, NY: McGraw-Hill, 1980.

Shea, James T. Basic Essentials of Mathematics, Book II. Austin, TX: Steck-Vaughn, 1975.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

There are eight basic prefixes used to represent the values of the metric system. If a person masters the prefixes and the values they represent, he or she is well on the way to a successful understanding of the metric system. Once the student understands how the prefixes are interchanged with the meter, liter, and gram he or she is well on the road to knowing the metric system.

LESSON PLAN # 1

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 — Fundamentals of the Metric System
(Unit or Block Title)

INFORMATION TOPIC # 1 (Technical - General - Guidance)

TITLE: Metric Prefixes

OUTLINE:

I Introduction to Terms

A. Three Types of Measurement

1. Meter
2. Liter
3. Gram
4. Activity # 1

Interaction Item # 1

B. Eight Prefixes

1. Mega
2. Kilo
3. Hecto
4. Deca
5. Deci
6. Centri
7. Milli
8. Micro
9. Activity # 2

Interaction Item # 2

II Establish Value Order of Prefixes

A. Whole Numbers

1. Mega: 1,000,000 units
2. Kilo: 1,000 units
3. Hecto: 100 units
4. Deca: 10 units

B. Explain Line of Separation

1. Whole number value
2. Decimal number value

C. Decimal Prefixes

1. Deci: .1 or 1/10 of a whole unit
2. Centi: .01 or 1/100 of a whole unit
3. Milli: .001 or 1/1,000 of a whole unit
4. Micro: .000001 or 1/1,000,000 of a whole unit
5. Activity # 3

III Summary and Closure

A. Introduction

B. Establish Value Order of Prefixes

C. It is important to know the value of the metric system and how the prefixes are interchangeable with values. It is particularly important to recognize and know the most commonly used prefixes such as milli, centi, hecto, and kilo. Once a person knows the value of the metric prefixes he or she will have very little trouble understanding the metric system and how it operates.

LESSON PLAN # 1

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 — Fundamentals of the Metric System-Metric Prefixes
(Unit Title)

INFORMATION TOPIC # 1 or DEMONSTRATION # ________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What are the three types of metric measurement?

2. What are the eight prefixes used in the metric system?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

The student will:

1. Demonstrate the length of one meter with metric stick; show the volume of a liter; and demonstrate the weight of a gram.

2. Discuss the value of each prefix and where the meaning came from.

3. Put a prefix ladder upon the chalkboard and discuss the differences between whole number and decimal prefixes.

LESSON PLAN # 1

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 **—** Fundamentals of the Metric System-Metric Prefixes
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

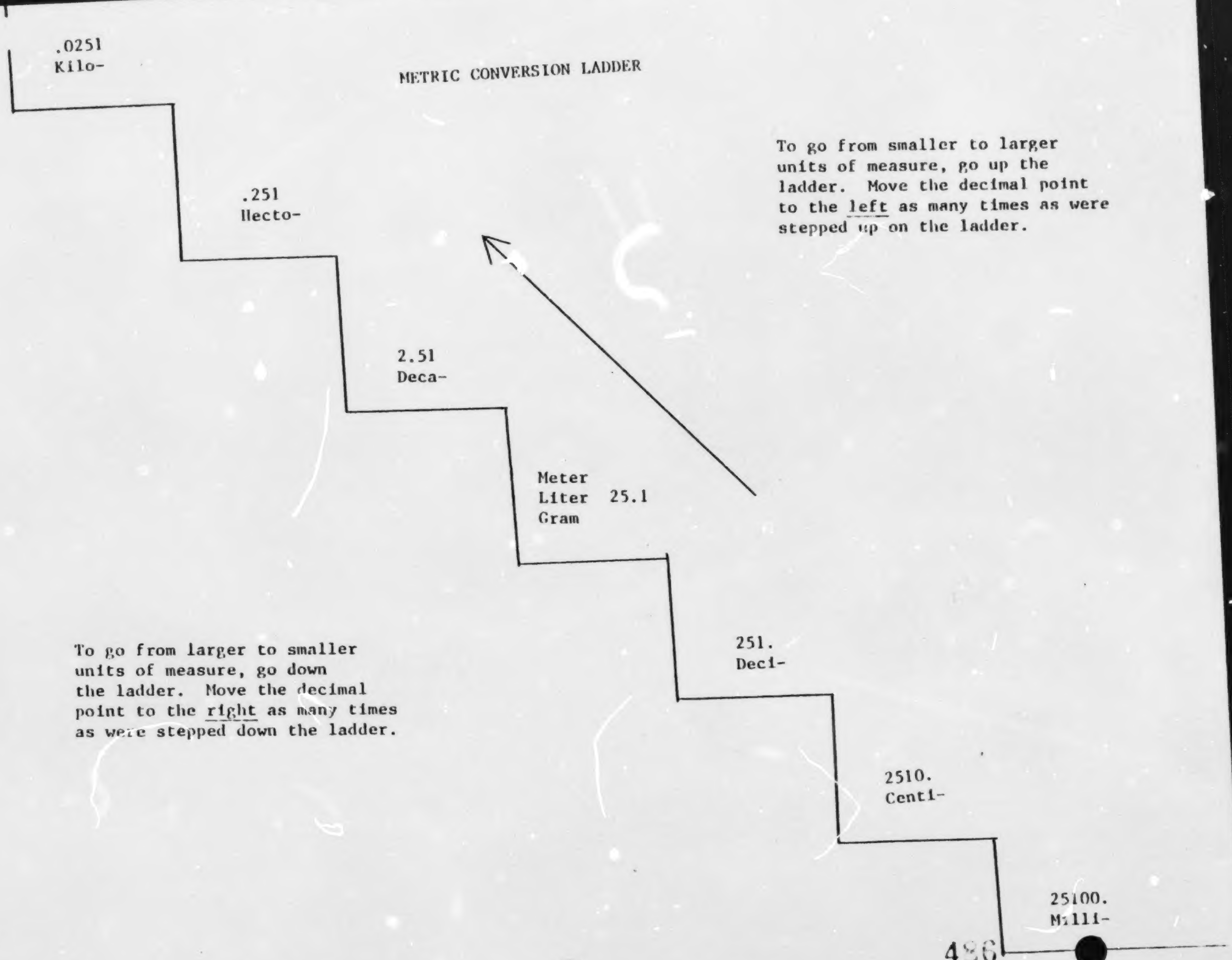
Directions: Name the value of the eight prefixes used for the metric system.

1. centi ______________
2. kilo ______________
3. micro ______________
4. deca ______________
5. hecto ______________
6. milli ______________
7. mega ______________
8. deci ______________

Directions: List the three types of measurement used in the metric system.

1. ______________________
2. ______________________
3. ______________________

METRIC CONVERSION LADDER


.0251
Kilo-
.251
Hecto-
2.51
Deca-
Meter
Liter
Gram
25.1
251.
Deci-
2510.
Centi-
25100.
Milli-

To go from smaller to larger units of measure, go up the ladder. Move the decimal point to the left as many times as were stepped up on the ladder.

To go from larger to smaller units of measure, go down the ladder. Move the decimal point to the right as many times as were stepped down the ladder.

LESSON PLAN # 2

LESSON PLAN FORMAT

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 Fundamentals of the Metric System

(UNIT TITLE)

SCOPE OF UNIT: The purpose of this unit is to give a brief introduction to the metric system. We will discuss metric prefixes, conversion of metrics to metrics within its own measurement system, and conversion of metric measurement to English measurement and vice versa.

INFORMATION TOPIC # 2 OR DEMONSTRATION #

Measurement Conversion

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions with 90% accuracy:

1. Convert 10 larger metrics to smaller metrics.

2. Convert 10 smaller metrics to larger metrics.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Pencil
Paper
Chalkboard
Handout - "Metric Conversion Ladder"

	(Name)	(Date)	Special Learning Features For:
Written By:	Millsap	6/21/82	Individual Instruction
Instructional Delivery System By:	487		

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Devine, Donald F. and Jerome E. Kaufmann. *Mathematics for Elementary Education.* New York, NY: *John Wilsy and Sons, Inc., 1974.* Pages 259-261.

REFERENCES: (BIBLIOGRAPHY DATA)

Breneman, John W., Associate Professor of Engineering Mechanics. *Mathematics*, Second Edition. New York, NY: McGraw-Hill, 1980.

Shea, James T. *Basic Essentials of Mathematics, Book II.* Austin, TX: Steck-Vaughn, 1975.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

At times when a person is using the metric system it is important to switch values of the measurement into a larger or smaller unit of measure. An example with the English system might be that of converting feet to inches or ounces to pounds, whereas in the metric system a person might convert kilograms to grams or decameter to centimeter. The metric system has a definite advantage over the English measurement system. In the English system, a person must know 1 yard=3,feet=36 inches,or 5280 feet=1 mile. This can get confusing! The metric system, which is based on 10's, is just a matter of shifting the decimal point in the proper direction in order to get the proper converted value.

LESSON PLAN # 2

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 — Fundamentals of the Metric System
(Unit or Block Title)

INFORMATION TOPIC # 2 (Technical - General - Guidance)

TITLE: Measurement Conversion

OUTLINE:

I Introduction

A. Introduction of Metric to Metric Conversion Ladder

1. Convert larger to smaller units of measure.
2. Convert smaller to larger units of measure.

B. Using the Conversion Ladder

1. Convert larger to smaller units of measure.

Interaction Item # 1

2. Convert smaller to larger units of measure.

Interaction Item # 2

II Methods of Conversion of Metrics to Metrics

A. Ladder Conversion Method

1. Activity # 2

B. Decimal Movement Method

1. Activity # 3

III Summary and Conclusion

A. Introduction

B. Methods of Conversion

C. It is obvious that a person cannot carry a ladder conversion chart with them wherever they go. The purpose of the chart is to give a better understanding of how the decimal point is moved to change the value of one unit of measurement to another. Eventually the student will be familiar with the system to apply it without using the chart and move the decimal point to the proper place.

LESSON PLAN # 2

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 — Fundamentals of the Metric System - Measurement Conversion
(Unit Title)

INFORMATION TOPIC # 2 or DEMONSTRATION # ______

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is 5 kilograms converted to grams; 10 meters converted to centimeters; 18 centiliters converted to milliliters?

2. What is 140 centiliters converted to deciliters; 360 centimeters converted to meters; and 7,248 grams converted to kilograms.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

The student will:

1. Make up 8 problems of conversion at the chalkboard. Once problems are placed on the board have students volunteer to work problems.

2. Demonstrate how the decimal is moved using the ladder.

3. Demonstrate how the decimal is moved without using the ladder.

LESSON PLAN # 2

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 **—** Fundamentals of the Metric System - Measurement Conversion

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

Directions: Convert the smaller units of measure to larger units of measure.

1. 26 millimeters = ________ centimeters
2. 38 milligrams = ________ grams
3. 62.325 grams = ________ hectograms
4. 8.625 milligrams = ________ grams
5. 32862 decigrams = ________ kilograms
6. 18 meters = ________ decameters
7. 150 milliliters = ________ centiliters
8. 38 decimeters = ________ meters
9. 1598 grams = ________ hectograms
10. 160 hectometers = ________ kilometers

Directions: Convert the larger units of measure to smaller units of measure.

1. 13 liters = ________ centiliter
2. 3 kilograms = ________ centigrams
3. 51 decameters = ________ decigrams
4. 768 kiloliters = ________ liters
5. 64.513 decaliters = ________ deciliters
6. 9.7 grams = ________ decigrams
7. 18 meters = ________ centimeters
8. 45 liters = ________ milliliters
9. 180 centigrams = ________ milligrams
10. 82 hectograms = ________ grams

LESSON PLAN # 3

LESSON PLAN FORMAT

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 Fundamentals of the Metric System

(UNIT TITLE)

SCOPE OF UNIT: The purpose of this unit is to give a brief introduction to the metric system. We will discuss metric prefixes, conversion of metrics to metrics within its own measurement system, and conversion of metric measurement to English measurement and vice versa.

INFORMATION TOPIC # 3 OR DEMONSTRATION # ________

Conversion of Metric Measurement to English Measurement
& English Measurement to Metric Measurement

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

Given the proper classroom conditions convert twenty metric problems by using a conversion chart (metric to English; English to metric) with 90% accuracy.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

Paper
Pencil
Handout - "Conversion Chart"

	(Name)	(Date)	Special Learning Features For:
Written By:	Millsap	8/2/82	Individual Instruction
Instructional Delivery System By:			

INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

Lying, Merwin J., L. J. Meconi, and Earl J. Zwick.
Career Mathematics: Industry and the Trades.
Boston, MA: Houghton-Mifflin Company, 1974.
Pages 203-220.

REFERENCES: (BIBLIOGRAPHY DATA)

Breneman, John W./ Associate Professor of Engineering Mechanics.
Mathematics, Second Edition. New York, NY: McGraw-Hill,
1980.

Same as above

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

At times it is important to know both a metric and an English measurement. This is made possible by the use of a conversion chart. This will allow us to take English measurements and convert them to metrics and do the reverse of converting metrics to English. As an example of conversion, suppose a person in a fabricator shop receives a blueprint measured in metric. The shop's measuring instruments are in English so the metrics must be converted. Another example is that of a chef who measures his cooking with metrics and finds a recipe in English measurement. To follow the recipe the chef must convert the English to metric measurements.

LESSON PLAN # 3

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 — Fundamentals of the Metric System
(Unit or Block Title)

INFORMATION TOPIC # 3 (Technical - General - Guidance)

TITLE: Conversion of English to Metric Measurement and Metric to English Measurement

OUTLINE:

I Introduction of Conversion Chart
  A. Metrics to English Section
  B. English to Metrics Section
  Interaction Item # 2
  Review

II Types of Math Involved
  A. Multiplication of Whole Numbers
  B. Multiplication of Decimal Numbers

III Different Types of Measurement Involved
  A. Length
  B. Volumes
  C. Weights
  Interaction Item # 1

IV Summary and Conclusion
  A. Introduction of Conversion Chart
  B. Types of Math Involved
  C. Different Types of Measurement Involved

D. By now you should be very familiar to the process of converting metrics & English measurements. If you are traveling on the highway and see a distance on a sign given in kilometers, see if you can remember the ratio or conversion amount. If you are buying food look on the packages because nine times out of ten they will contain both English and metric measurement. Compare it! A person must be aware of changes around him in the measurement system whether using English or metric and be conscious of the value of each.

LESSON PLAN # 3

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 — Fundamentals of the Metric System
(Unit Title)

INFORMATION TOPIC # 3 or DEMONSTRATION # ________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

Conversion of English to Metric Measurement and
Metric to English Measurement

1. What are other examples of how measurements must be converted from one measurement system to the other?

2. What are the rules of multiplication of decimals and how do they apply?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Work examples on the chalkboard as an example.

2. Give conversion chart handout to students along with exercise handout to be worked by the student to make sure the lesson plan is understood completely.

LESSON PLAN # 3

COURSE TITLE/NO. Mathematics Tutor

UNIT # 1 **—** Fundamentals of the Metric System
(Unit or Block Title)

EVALUATION ITEMS: **(Oral, Written, or Performance to measure attainment of lesson objectives)**

Conversion of English to Metric Measurement and
Metric to English Measurement

Directions: Convert the following problems.

1. 5 meters = ____________ feet
2. 7 inches = ____________ millimeters
3. 2 gallons = ____________ liters
4. 18 pounds = ____________ kilograms
5. 40 liters = ____________ gallons
6. 13.8 quarts = ____________ liters
7. 35 ounces = ____________ grams
8. 2.9 kilometers = ____________ mile
9. 92 inches = ____________ meters
10. 18 centimeters = ____________ inches

11. 112 milliliters = ____________ ounces

12. 513 yards = ____________ meters

13. 71.9 meters = ____________ yards

14. 3 quarts = ____________ liters

15. 13 pints = ____________ liters

16. 6 tons = ____________ megagram (metric ton)

17. 3600 meters = ____________ mile

18. 180 millimeters = ____________ inches

19. 1300 grams = ____________ ounces

20. 14 pounds = ____________ kilograms

CONVERSION CHART

	When you know the	You can find the	If you multiply by
LENGTH	inches	millimeters	25
	feet	centimeters	30
	yards	meters	0.9
	miles	kilometers	1.6
	millimeters	inches	0.04
	centimeters	inches	0.4
	meters	yards	1.1
	kilometers	miles	0.6
AREA	square inches	square centimeters	6.5
	square feet	square meters	0.09
	square yards	square meters	0.8
	square miles	square kilometers	2.6
	acres	square hectometers (hectares)	0.4
	square centimeters	square inches	0.16
	square meters	square yards	1.2
	square kilometers	square miles	0.4
	square hectometers (hectares)	acres	2.5
MASS	ounces	grams	28
	pounds	kilograms	0.45
	short tons	megagrams (metric tons)	0.9
	grams	ounces	0.035
	kilograms	pounds	2.2
	megagrams (metric tons)	short tons	1.1
LIQUID VOLUME	ounces	milliliters	30
	pints	liters	0.47
	quarts	liters	0.95
	gallons	liters	3.8
	milliliters	ounces	0.034
	liters	pints	2.1
	liters	quarts	1.06
	liters	gallons	0.26
TEMPERATURE	degrees Fahrenheit	degrees Celsius	5/9 (after subtracting 32)
	degrees Celsius	degrees Fahrenheit	9/5 (then add 32